Journal

of the

Royal Army Medical Corps

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EDITED BY

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MAJOR-GENERAL SIR DAVID BRUCE,

K.C.B., LL.D., D.Sc., F.R.C.P., F.R.S.

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Obituary.

MAJOR-GENERAL SIR DAVID BRUCE, K.C.B., LL.D., D.Sc., F.R.C.P., F.R.S.

BY the death of Sir David Bruce the country has lost one of its foremost research workers in tropical diseases, and the Corps an officer whose distinguished scientific attainments will serve as an incentive to the younger generation for many years to come.

Bruce will always be included in the small group of men containing the honoured names of Sir Patrick Manson, Sir Ronald Ross and Sir William Leishman, who laid the foundations of modern tropical medicine.

Bruce was born in 1855 at Melbourne in Australia, but at the age of 5 he was sent to Stirling in Scotland and was educated at the High School there. When 14 years old he went to Manchester and worked in the warehouse of Messrs. Phillips and Co., where he remained for three years and devoted his leisure time to boxing and football. In 1876 he returned to Scotland and entered the University of Edinburgh. He was a medallist in Natural History and Comparative Zoology and took the degrees of M.B., C.M. He was the first man of his year, receiving the Eccles Scholarship. While working in Edinburgh he developed a taste for ornithology and spent some years searching the Grampians for rare birds.

Bruce had a fine physique and great independence of character. His dogged determination to succeed was perhaps the result of his Australian birth and Scottish upbringing. He left nothing to chance. We can visualize him preparing for one of his expeditions, wearing his white coat in the laboratory and surrounded by books of reference on the subject to

be investigated, Lady Bruce working with him and making those wonderful drawings which did so much to enhance his work. He would take some time planning his scheme of work, but that completed off he went and nothing would turn him until the work was brought to a successful conclusion. Difficulties only spurred him on to fresh exertions.

Bruce died full of honours and had the satisfaction of knowing that most of the work to which he had set his hand had been of untold benefit not only to the soldiers he loved so well, but to mankind in general.

It was truly tragic that the last years of a most useful life should have been clouded by the illness and death of Lady Bruce, his faithful companion in his travels and his assistant in all his scientific work.

Bruce joined the Army as a Surgeon in 1883; other distinguished officers in his batch being Sir William Macpherson and Sir Robert Firth.

In 1884 he proceeded to Malta and while there began the scientific investigations which brought him world-wide fame. He conducted an inquiry into an outbreak of cholera in Malta and was thanked by the Civil Government and the Director-General, Army Medical Services for his work.

He studied the prevalent fevers in Malta and succeeded in showing that Malta or Mediterranean fever was caused by a special microbe which he called the *Micrococcus melitensis*.

In 1889 Bruce was appointed Assistant Professor of Pathology at the Army Medical School, Netley, and remained there for five years. He studied bacteriology under Professor Koch in Berlin, and then initiated the first course in bacteriology ever held in a medical school in England.

In 1894 Bruce went to South Africa, and in 1898 he was asked by the Natal Government to investigate "nagana" and tsetse fly disease in Zululand, which at that time were thought to be distinct diseases. After two months' research he proved that a trypanosome was responsible for both nagana and tsetse-fly disease, and that the trypanosome, now known as the *Trypanosoma brucei*, was carried from one animal to another by the fly *Glossina morsitans*. He was thus the first to prove that an insect may carry a protozoon of a pathological kind. He studied nagana in a large number of domestic animals, and also found *T. brucei* in the wild animals in South Africa. His investigations were much appreciated by the Secretary of State for the Colonies. The work also obtained immediate recognition in scientific circles. Bruce was made a Fellow of the Royal Society, and received the Cameron Prize of the University of Edinburgh.

Bruce was in South Africa when war broke out. He was present at the Siege of Ladysmith and for his services in the war was specially promoted to the rank of Lieutenant-Colonel and received the medal with seven clasps. He was appointed a member of the Committee which investigated the prevalence of dysentery and typhoid fever during the South African War. The Report of the Committee was presented to Parliament.

In 1902 Bruce was made a member of the newly constituted Army Medical Advisory Board, and served on the Board until 1910.

In 1903 he was promoted to the rank of Brevet Colonel, the first brevet given for scientific services.

In 1903 Bruce went to Uganda on an expedition sent by the Royal Society to investigate sleeping sickness. Working in conjunction with Castellani he showed that the disease was caused by the *Trypanosoma gambiense* and that this was conveyed from the sick to the healthy by the fly *Glossina palpalis*. In 1908 he again went to Uganda as Director of the Royal Society's Commission on Sleeping Sickness.

In 1904 he was appointed Chairman of the Royal Society's Committee in London which sent a commission to Malta to investigate Mediterranean Fever. As a result of the labours of the Commission it was shown that Mediterranean fever was mainly disseminated through the agency of milk from goats infected with the *M. melitensis*. When the use of goats' milk was discontinued in the Services, Mediterranean fever practically disappeared from among the naval and military forces in Malta.

In 1904 Bruce was appointed editor of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, a post which he held until 1908.

In 1911 he went to Nyasaland as Director of the Royal Society's Commission to investigate the connection, if any, between the wild animals and human and stock diseases.

The Commission found that the common tsetse fly in Nyasaland was *Glossina morsitans*, and that the polymorphic trypanosome, *T. brucei*, was present in wild flies. All the big game were infected with this fly, but not in sufficiently large numbers to affect their health. In the blood of cases of sleeping sickness a trypanosome was found which could not be distinguished from the polymorphic trypanosome in the local fly. Both trypanosomes had the same forms and were identical in their action on experimental animals. They resembled *T. rhodesiense*, but were easily distinguished from *T. gambiense*, the cause of sleeping sickness in Uganda.

The Commission found that they could infect antelopes with the human strain, but had to leave unsettled the problem whether the animal strains could infect man. Later, Dr. Taute, a German investigator, showed that the trypanosomes in animals were not infective for man. He fed infected flies on himself, two assistants, and on more than a hundred natives; none of them became infected. Recently Dye, in Nyasaland, has shown on epidemiological grounds that human cases of sleeping sickness are probably infected from other human cases. The human strain seems to lose its power of infecting man when passed through animals, and consequently game may act as a buffer to man.

In 1912 Bruce was specially promoted Surgeon-General for his scientific services.

In 1914 he was appointed Commandant of the Royal Army Medical College and remained there until 1919. During the War he was Chairman

of the War Office Pathological Committee and of the Committees for the study of Tetanus and Trench Fever. He was placed on retired pay in 1919.

In 1923 he received a Good Service Reward, and in 1924 he was appointed Colonel-Commandant of the Royal Army Medical Corps.

Bruce was the recipient of many honours. He was appointed a C.B. (civil) in 1905, and was made a Knight Bachelor in 1908, and K.C.B. in 1918. He received a Royal Medal from the Royal Society in 1904; the Mary Kingsley Medal in 1905; the Stewart Prize of the British Medical Association in 1908; the Leeuenhoek Medal from the Dutch Academy of Science in 1915; the Buchanan Medal of the Royal Society in 1922; the Manson Medal of the Royal Society of Tropical Medicine and Hygiene in 1923; the Albert Medal of the Royal Society of Arts in 1923.

He was made an F.R.C.P. London in 1906, and was Croonian Lecturer in 1915. The honorary degree of D.Sc. was conferred on him by the Universities of Dublin and Toronto, and the LL.D. by the Universities of Glasgow and Liverpool. He was made an Honorary Fellow of the Royal Society of Edinburgh; Correspondent, Académie des Sciences, Institut de France; Foreign Correspondent, Académie de Médecine, Paris; Membre honoraire, Société de Biologie; Membre honoraire de la Société de Pathologie exotique; a Corresponding Member of the Royal Philosophical Society, Glasgow. He was elected a member of the Athenæum Club under the special clause for scientific services.

He served on the Council and on many committees of the Royal Society.

In 1916 Bruce was made Chairman of the Governing Body of the Lister Institute and retained the position until his death.

In 1924 Bruce was selected for the post of President of the British Association Meeting held at Toronto, a crowning honour of a life devoted to science. He delivered the Presidential Address, taking as his subject "The Prevention of Disease."

Bruce was singularly fortunate in his married life. In 1883, just after he had joined the Army, he married Mary Elizabeth Steele, daughter of the late Dr. Steele, of Reigate.

Lady Bruce always accompanied her husband on his foreign tours and on his various expeditions to tropical Africa. She was present in Ladysmith during the siege and for her work, other than nursing, received the Royal Red Cross. During the late war she was an active member of the R.A.M.C. Comforts and Prisoners of War Fund. She was also of great assistance to the Committees on Tetanus and Trench Fever, and for her services received the O.B.E.

Bruce was ever ready to acknowledge how much he owed to her help and encouragement in his scientific work, and those who worked with him on the various commissions know well that he did not overstate the truth.

Original Communications.

THE MILITARY MALARIA PROBLEM IN HONG KONG.

By Major F. HARRIS, M.C.
Royal Army Medical Corps.

I.—General Description of the Crown Colony of Hong Kong.

The Crown Colony of Hong Kong, situated in latitude 22° N. and longitude 114° E., comprises the Island of Hong Kong, several other islands of the Ladrone Group, and the mainland of Kowloon. The total area of the Colony is 410 square miles, of which the mainland contains 286, Hong Kong Island 29, and the other islands the remainder.

The Island of Hong Kong lies off the coast of South China, 20 miles east of the Pearl River, and has been a British colony since 1841, when it was ceded—*in perpetuam*—by the Emperor of China to the British Crown. The major part of the Island consists of a barren range of hills, nearly 2,000 feet in height, running for 11 miles east and west, and having a depth from north to south of from 1 to 4 miles.

When he ceded Hong Kong to Britain, the Emperor of China is said to have laughed, so valueless ninety years ago was this barren rock considered. To-day the Colony can boast a port which ranks fourth in the world, and has immense strategic importance, not only as a naval base, but as the only Imperial coaling station for the British Navy east of Singapore. The present military population is 4,000, and its importance as a military station appears likely to increase.

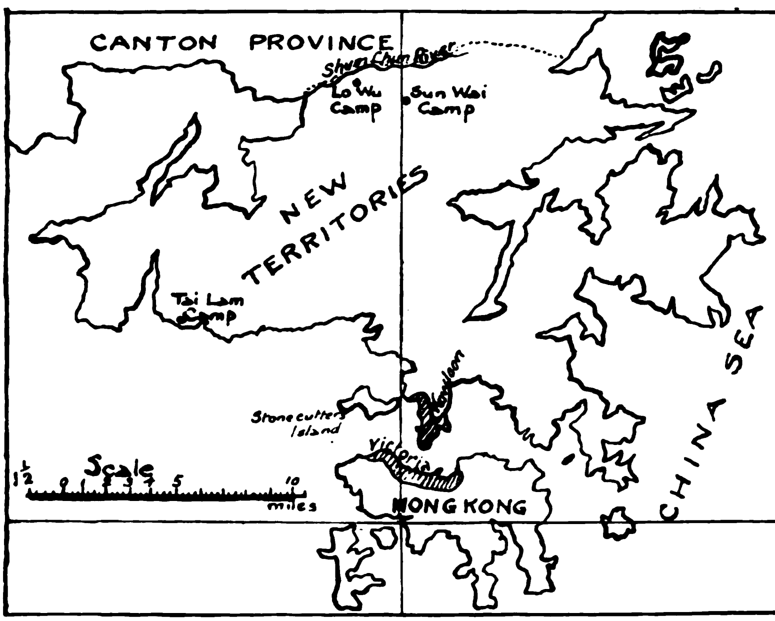
A mile to the north, across the narrowest part of the magnificent harbour, lies the mainland, consisting of the peninsula of Kowloon, held in perpetual lease since 1860, and the New Territories, leased to Britain for a period of ninety-nine years from 1898. The Kowloon Peninsula and the New Territories together form a large peninsula of irregular shape, some eighteen miles in depth, bounded on the north by the Sham-Chun River, which forms the dividing line between British territory and the Chinese province of Canton.

The chief cities of the Colony are Victoria, situated on the island, and Kowloon on the mainland. Although divided by the harbour they may be considered as one city, and together have a population of 600,000, of which roughly 8,000 are British, 4,000 other non-Chinese nationals, and the balance Chinese.

The Chinese population fluctuates greatly, as the Colony is extensively used as a sanctuary by Chinese living across the frontier. When trouble brews in Canton, as it frequently does, there is a steady influx of Chinese

nationals into British territory. Hong Kong is also extremely popular as a haven of refuge for retired Chinese generals who, having made their fortunes by adventurous methods in their own country, find it wiser to abandon the scene of their former triumphs and spend the remainder of their lives in the security of the Pax Britannica.

The famous Victoria Peak, rising 1,700 feet at the back of Victoria City, forms the residential district of the wealthy European class, and no Asiatics, other than servants, are allowed to live within its exclusive pale.



Both the island and the mainland are of igneous origin, the surface consisting, in general, of disintegrated granite and hard rock. Beds of clay, however, are found in several places, even on the tops of the highest hills. The whole Colony is extremely hilly and, topographically, may be described as a series of massive granite ridges, sloping down to the sea, separated by narrow valleys.

The further into the New Territories one advances the wider the valleys become, until, towards the Sham-Chun River, many are several hundred acres in extent. The lower ends of all the larger valleys have marshy clay bottoms, intersected by innumerable sluggish streams which originate in the hills forming the valley walls. In their journey down the granite slopes these streams run in steep shallow courses over rocky beds, here and there interrupted by miniature waterfalls and small pools. As they reach the level ground they quickly lose momentum and meander in slow serpentine fashion through the padi fields. Their volume of water depends very largely on the rainfall, but they are never quite dry. The valley floors in addition

are fed by constant seepage, which in Hong Kong is always to be found where the steeper side of a valley meets the level ground.

About one-sixth of the whole colony is flat and is intensively cultivated, two crops of rice being grown each year. The remaining five-sixths are mountainous and unproductive.

II.—The History of Malaria in Hong Kong.

When the British first took possession of the Island of Hong Kong in 1841, the total Chinese population ashore and afloat was about 5,000, chiefly stonecutters, smugglers and vagabonds. Soon after occupation malaria seems to have made its appearance, and on June 13, 1841, the Senior Naval Officer, Sir H. Le Fleming Senhouse, died of this disease.

In the autumn of 1841 a severe outbreak of a "peculiar malarial fever" occurred which was attributed to terracing the hillsides preparatory to building the City of Victoria. (Eitel.)

By 1842 the Chinese population had increased to 20,000, many of them fugitives from justice in their own country, others were coolies attracted from the mainland by the employment offered by the British in building barracks and houses; and all, no doubt, carriers of malaria.

"Malignant fever" now became exceedingly rife and the mortality was extremely high. From May to October, 1843, no less than 10 per cent of the civil population died from this cause (Eitel), and so unhealthy did the island become that at this time the terms Hong Kong and Hell were looked upon as synonyms. By 1844 the situation appears to have been at its worst, and so devastating were the effects of "paroxysmal fever," "intermittent fever," "malarial fever" and "Hong Kong fever," that there was serious talk of abandoning the Colony. Luckily sterner counsels prevailed, and from this date the incidence of malaria declined in Victoria.

As in other parts of the world, it was realized that the occurrence of malaria was a sequel to opening up new country, and, as elsewhere, the cause was attributed to overturning fresh soil, to defective drainage, to overcrowding in barracks, to excessive night duty, to the night mists which occur so frequently in Hong Kong, to miasma from the swamps, and to many other causes. An unusual reason was also put forward; that the remittent fever was due to a poison given off by disintegrated granite. This view held sway for many years, and to this day has some few adherents among the civil population of Hong Kong. Major W. K. Morrison, D.S.O., in his article in the Journal of the Royal Army Medical Corps of May and June, 1930, records how he himself met a lady in 1929 who had suffered from fever due to disintegrated granite!

And yet, the early settlers in Hong Kong were very near the truth. Disintegrated granite *was* a factor in the causation of malaria, for *Anopheles maculatus* and *Anopheles minimus*, notorious carriers of malaria in Hong Kong, delight to breed in the clear streams with a granite bottom and in seepage from disintegrated granite hillsides, both characteristic of the

Hong Kong landscape and found in every ravine. And the exponents of the theory of the freshly turned soil were also near the mark, for the carriers of malaria were the thousands of coolies who turned the soil.

It is interesting to note that it was observed at this time that, although the white population suffered so severely from intermittent fever, the coolie population appeared immune. No doubt this fact prevented anyone expressing the opinion that the disease might be due to an infection caught from the coolies. And to-day, although the native Chinese is the undoubted carrier of malaria in Hong Kong, he appears to suffer little from the frank disease.

Stanley Peninsula appears to have been the first place occupied by British troops, and while the civil population was being decimated at Victoria, the troops at Stanley were, if anything, suffering more severely. From May to October, 1843, "malarial fever" carried off as many as 24 per cent (Eitel) of the 1,526 soldiers then stationed on the island. Yet Stanley must have appeared to the military authorities of those days an ideal situation for a cantonment. A bold promontory on the south side of the island, jutting well out into the blue China Sea, with its hillsides scored by crystal streams, must have seemed to them all that could be desired.

Hundreds of coolies levelled the site, built the barracks and infected the myriads of *A. maculatus* and *A. minimus* which bred in the crystal streams. And the mosquitoes in turn infected the hapless British troops who subsequently occupied Stanley Barracks.

As can be seen from the tombstones still standing in Stanley cemetery, the death roll was excessive, and the incidence of malaria at this time appears to have been thousands per thousand of strength per annum. In the late 1840's Stanley was evacuated and the troops moved to Victoria, by now a flourishing city, from which fever had almost disappeared. This was naturally attributed to the dispersal of the noxious miasma of decomposed granite, due to the passage of time, and to the fact that the site had been built over.

Again public opinion was indirectly correct. The drainage of the city site, the training of the hill streams, and the building of houses had caused the disappearance of most of the breeding places of *A. maculatus* and *A. minimus.*

By this time also the lower slopes of the Victoria Peak were clothed in young trees and shrubs, and this constituted another important factor in the disappearance of malaria. Neither the larvæ of *A. maculatus* nor *A. minimus* thrive in the shade, and when such erstwhile sunny streams as remained undrained were in shadow, suitable breeding places were few and far between. The city of Victoria has remained healthy and free from malaria to this day.

Stanley Peninsula is now the site of a school for Chinese boys, and has a great reputation for healthiness. In 1930, at the opening ceremony of

the school, a distinguished speaker congratulated the school on having successfully overcome the difficulties which had caused the military authorities to abandon the site on account of malaria in the early days of the Colony. In actual fact no anti-malaria work had been carried out by anyone, but a highly immune Chinese population had been substituted for a susceptible British community, with the happiest results.

In 1860 Kowloon was occupied for a time by the troops assembling in Hong Kong in readiness for the China War. A serious outbreak of malaria promptly occurred. From 1860 to 1865 small detachments were quartered in Kowloon from time to time, chiefly for musketry practice and training. Always the story was the same; after a short residence on the mainland the majority of the soldiers contracted malaria.

In 1865 Kowloon was occupied permanently by British troops and at once they were decimated by fever. The sick wastage from this cause was appalling, and Major Morrison has graphically described the sufferings of the troops, when hardly a man out of the regiment occupying Kowloon was fit for duty owing to fever. Again the same set of circumstances was present as in Victoria and Stanley in 1841 and 1842; the occupation by a susceptible population of virgin country in which *A. maculatus* and *A. minimus* flourished, and the accumulation of highly-infected carriers in the shape of Chinese coolies working on the new buildings.

In course of time Kowloon was built over and the hill streams drained. *A. maculatus* and *A. minimus*, as always, disappeared in the presence of urban surroundings, Kowloon City became free of fever, and remains so to the present day. Malaria to-day, however, lies dormant but potent in the rural and suburban districts, and woe betide any susceptible population which takes the risk of dwelling, without due anti-malaria precautions, on the slopes of a pleasant hill, with its sparkling mountain streams and picturesque Chinese villages.

In 1928, owing to force of circumstances, partly due to the congestion of troops of the Shanghai Defence Force in Hong Kong, certain British regiments went into camp in the New Territories without adequate anti-malaria precautions, and the history of Stanley in 1841, and Kowloon in 1865, repeated itself. These regiments suffered severely from malaria, and one of the camps had to be closed and the troops brought back to Victoria. Twenty-five years ago the incidence of malaria among the British troops was 500 per 1,000 per annum. In 1929 it was 119 per 1,000, and in 1930 it was 56 per 1,000.

III.—The General Malaria Situation in Hong Kong To-day.

The real extent to which malaria flourishes in the Colony of Hong Kong to-day is not generally appreciated by the civil European population. Hong Kong, being a trade clearing house pure and simple, and the hub of its activity being centred in the cities, has no rural labour problem, such as exists in the rubber estates of Malaya and Sumatra, or in the tea

gardens of Assam, to focus attention on the ravages of malaria in the country districts. The Chinese city population of merchants, clerks, servants, artisans, and coolies, whose welfare more closely affects the European community, is, generally speaking, free of malaria.

A large proportion of this city population originated, of course, in the rural districts, and its casualties are replaced by immigrants from the country; but after a time, in the course of nature and in the absence of vectors to keep the disease alive, the frank malarial attacks of these immigrants die down and they pass as healthy individuals. A very large number naturally harbour gametocytes in their blood, but so long as they remain in the cities, where there are no malaria-carrying mosquitoes, they are harmless. Malaria, therefore, tends to die out in the cities of Victoria and Kowloon, and certainly does not make its presence felt by the casual observer.

Among the rural Chinese population, however, malaria is active and widespread, although it manifests itself in a comparatively mild form among the southern Chinese. The country population being composed of peasant proprietors and fishermen, the occurrence of malaria among them is not so strikingly important as it would be in the case of hired labour.

In general, it may be said that the better-class civilian in Hong Kong is well nigh unaware that malaria exists in the Colony.

The susceptible European population lives mostly in modern town houses, and although there are certain European suburban districts where a few groups of houses exist, and where malaria is definitely in evidence, the owners, not unnaturally, do not lower the value of their property by advertising this fact, always bearing in mind that they will one day wish to sell out on retiring.

Within the last few years more interest has been taken in the problem as a whole, and a malariologist has recently been appointed by the Local Government to investigate the question of malaria in Hong Kong and the New Territories. It does not appear very likely, however, that anti-malaria measures will be taken in the near future.

Two factors appear to have an influence on this. The Colony is at present undergoing a period of acute trade depression and has no money to spare, and secondly, that section of the population on whom the expense of the anti-malaria work would chiefly fall is just the section which scarcely suffers from malaria at all, either in its direct or remote effects. It is not surprising, therefore, that universal enthusiasm for large-scale anti-malaria schemes is not noticeable in Hong Kong; such, indeed, could not be expected. However, a very complete survey of the malaria situation is being carried out, and much valuable information is being acquired.

Malaria not being a notifiable disease under the Civil Health Code, its true incidence among the civil population, both European and Chinese, is unknown. The number of civilian deaths recorded during 1928 for

malaria amounted to 295, or 2 per cent of the total deaths in the Colony. From this figure it would appear a fair assumption to deduce that malaria is widely prevalent among the Chinese population, especially when one takes into account the fact that malaria is usually such a mild disease among the Chinese.

IV.—Factors Influencing the Occurrence of Malaria in Hong Kong.

(*a*) *Meteorological Factors.*

The atmospheric conditions in Hong Kong are particularly favourable to the successful development of the mosquito.

Situated just south of the Tropic of Cancer, its climate is tropical for nine months of the year, and for the remaining three months temperate in character. At all seasons the relative humidity is high, and the variation between maximum and minimum temperature slight. From early March the maximum temperature rises steadily from the neighbourhood of 70° F. until by the middle of May it has reached 88° F. At, or near, this point it remains day after day, with only slight variations, until the middle of October, when it begins its slow decline to a point in the neighbourhood of 70° F., which temperature is reached by the end of November. Although, following a dry spell, occasional rises of temperature to 92° F. may occur, and conversely, following any heavy rains, a temporary drop lasting a day or so may take place, the most marked characteristic of the Hong Kong summer temperature is its small variation, both from day to day and between maximum and minimum.

Although there is rain to a greater or less extent in every month in the year, the rainy season may be said to begin in April and to continue until the end of September, with May, June, July and August as the wettest months. The average rainfall for these four months over a period of forty years amounted to fifty-four inches, and the annual average over the same number of years was eighty-five inches.

From April to October the relative humidity is excessive, frequently being over ninety per cent and having a monthly mean of eighty per cent. This steamy atmosphere, together with the very slight morning and evening variation in temperature, renders the nights extremely trying.

As a contrast, however, the winter months of December, January and February are delightful, being somewhat similar to an English summer. On occasions, a so-called cold snap occurs, when one is glad of an overcoat at night, and during January and February fires are in evidence in the evenings in most houses.

The mean monthly temperature for the three winter months is 65° F., while the mean relative humidity is seventy-five per cent.

Anopheline mosquitoes, both adults and larvæ, are in evidence throughout the year. Larvæ undergo their metamorphosis and adults bite freely

during every month in the year, although the months of their greatest activity are August, September and October. Malaria is prevalent throughout the year, though, as would be expected, its maximum incidence is in September, October and November.

(*b*) *The Vector.*

The Colony is well supplied by nature with potential carriers of malaria, six species of anopheles mosquitoes being found: *A. maculatus, A. minimus, A. karwari, A. jeyporiensis, A. aitkenii* and *A. hyrcanus.*

Fig. 1.—Among the stones in the foreground there are shallow rocky pools in which *A. maculatus* larvæ were found in large numbers.

A. maculatus.—This mosquito is by far the commonest stream breeder in Hong Kong. It flourishes equally on the island and on the mainland, and can always be found in the clear hill streams or in the pools formed by seepage from the disintegrated granite walls of the ravines. It especially favours rocky nullahs with their scanty vegetation, their sparkling, trickling streams flowing through clear granite pools, and their free exposure to sunlight. It will also be found, though not nearly so

commonly, in the irrigation streams which feed the padi fields. Hong Kong, with its countless hills and valleys, forms its ideal nursery.

The adults bite readily at night and, although chiefly out-of-door mosquitoes, are frequently found in houses and barrack rooms. The strong probability is that *A. maculatus* is a very important, if not the most important, malaria carrier in Hong Kong. In every district in which it occurs, with the exception of the Peak, malaria is prevalent. In the Lyemun barracks area it is the only anopheles found, other than *A. hyrcanus*, which is only found here in small numbers, and malaria at Lyemun is a constant source of anxiety to the military authorities. The months of August, September and October are the months of its greatest prevalence, and September, October and November are the months of the highest malaria incidence. From early November to late April its numbers rapidly decline, although the numbers of *A. minimus* (which has the greatest claim to being its rival as a malaria carrier) do not show any corresponding fall. And it is from December to May that the malaria incidence is at its lowest. In May *A. maculatus* again begins to increase, and in July the malaria incidence begins its upward climb.

According to Major G. Covell, I.M.S., *A. maculatus* has been infected experimentally with malignant tertian parasites in Malaya and in the Philippines, and has been found infected naturally in Malaya and the Dutch East Indies ; in the latter place it is considered to be one of the most important carriers. There does not appear to be any reason why, in Hong Kong, with similar topography and climate, it should not be of equal importance. Although it has not yet been proved by dissection in Hong Kong to be a carrier, on epidemiological grounds alone its claim to be a dangerous propagator of malaria appears good.

There is one interesting point about its distribution in the Island of Hong Kong. Although it is the only anopheles found in the Peak district (1,200 to 1,700 feet above sea-level), malaria does not occur in this area. Its presence here, however, is not common. There is no meteorological reason why it should not carry malaria at this height in Hong Kong, as the mean temperature of this district from May to November is over 70° F., and the mean relative humidity for the same period seventy-eight per cent. There is also a highly infected carrier population in the presence of Chinese servants, and a susceptible European population.

A. minimus.—This mosquito is the next commonest of the stream breeders in Hong Kong, although its numbers fall short of those of *A. maculatus*, the approximate proportion being as 1 to 5. In Hong Kong it is essentially a stream breeder, and its breeding habits are identical with those of *A. maculatus*, being found with it in the hill ravines. Its larvæ, however, appear to be commoner habitants of the grassy streams which flow through the rice valleys than are those of *A. maculatus.* During 1930 no larvæ or adults were found at Lyemun, but elsewhere they appeared to be evenly distributed throughout the Colony.

The adults bite freely and are found in houses. *A. minimus* is looked on as an important natural carrier of malaria in Malaya, the Philippines, Formosa and South China. It is stated by Major G. Covell, I.M.S., to have been not only infected experimentally with malignant tertian malaria parasites, but to have been found infected in nature. The question as to whether it is of equal or greater importance in Hong Kong than *A. maculatus* is not yet settled; but since, in Hong Kong, their breeding habits are almost identical, the question seems to be more of academic than of practical importance.

A. karwari.—Very much less common in Hong Kong than *A. maculatus* or *A. minimus*, this mosquito breeds in the same hill streams and ravines, but seems to enjoy the presence of vegetation more than the other two. It is doubtful if it has ever been proved to be a carrier of malaria, and certainly in Hong Kong, from its paucity of numbers, cannot play any serious part in the malaria incidence. Barber (1918) in Malaya, however, found that this species could easily be infected experimentally with malignant tertian malaria parasites.

A. jeyporiensis.—This species, also a stream breeder, is found in Hong Kong in about similar numbers to *A. karwari.* It does not appear ever to have been found infected either in nature or experimentally, and is not considered of any importance in Hong Kong as a transmitter of malaria.

A. aitkenii.—This is a very rare species in Hong Kong, although a few larvæ were found in 1930 by the Chief Assistant to the Hong Kong Government Malariologist.

A. hyrcanus (var. *sinensis*).—This species is present in relatively small numbers on the Island of Hong Kong and in very large numbers in the rice fields districts of the New Territories. It is also found on the Island of Stonecutters, which lies in the harbour. It is a swamp breeder, and is found in the sluggish streams around the rice fields, in the rice fields themselves, chiefly along the grassy edges of the bunds, and in the quiet grassy pools along the banks of the larger slow-moving streams and small rivers. It is liable to be found in the Colony of Hong Kong wherever there is still shallow water and luxuriant vegetation. It is not considered to be of great importance in Hong Kong as a carrier, possibly because the adults do not frequent houses.

On the Island, where its numbers are few, malaria is just as prevalent as on the mainland, where its numbers are enormous. During the 1930 camping season, at the military camps at Sun Wai and Lo Wu, extensive anti-malaria work (oiling) was carried out on the hill streams, but the countless padi fields which closely adjoined the camps and the large slow-moving streams of the plains were, owing to the magnitude of the task, left alone. *A. hyrcanus* larvæ were found continually and in large numbers throughout the whole camping season close to the camps (within 400 yards) on all sides, while the larvæ of the stream breeders, owing to the work on the streams, were absent. Yet only nine cases of malaria occurred at these

two camps in four months. Had *A. hyrcanus* been a potent carrier, the malaria incidence must have been much greater.

During this time the mean monthly temperature and mean relative humidity were never below 70.

Undoubtedly, in other parts of the world, *A. hyrcanus* is definitely concerned in the transmission of malaria, and in Shanghai, where it appears to be the only anopheles present, malaria is prevalent during the summer months. Covell states that Yamada considers *A. hyrcanus* (*sinensis*) to be responsible for benign tertian malaria in Japan, Korea and Formosa. It is also recorded by Covell that it has been infected experimentally in Formosa, Malaya, and in the Dutch East Indies, and that it has been found infected naturally in Malaya and in the Dutch East Indies.

FIG. 2.—A corner of a padi-field. Typical *A. hyrcanus* (var. *sinensis*) country.

(c) *The Reservoir of Infection.*

The native Chinese population appears to be the chief, if not the only, reservoir of infection. When the European, either civil or military, contracts malaria, he is promptly treated, and in the ordinary course of events is unlikely to become a carrier.

With the native Chinese it is vastly different. The southern Chinese has long been known to regard malaria as a trivial disease, to suffer as a rule slight effects, and merely to remain in his house for a day or so during an attack. Further, the bulk of the population, if they adopt any treatment at all, utilize that which is offered by local practitioners of Chinese medicine, and in which old-fashioned decoctions of herbs predominate to the exclusion of quinine. It is only when *in extremis*, or when his funds are exhausted, that European aid is sought. Such cases, no doubt, contributed their quota to the 295 deaths which occurred from malaria in 1928.

Under such conditions, with active vectors in abundance, and with no precautions taken against mosquito bites, it is probable that in the country districts almost every Chinaman carries gametocytes in his blood. And, since the city population is recruited from the villages, a large proportion of urban Chinese must also be carriers.

That this is the case appears likely from the following facts. In August, 1930, while the writer was carrying out investigations into the malaria question at Lyemun, it was found that 20 per cent. of the Chinese servants employed in this barracks had gametocytes in their peripheral blood. All these servants had been employed for over a year in barracks, and none had been off duty for illness during that period. At the time that the gametocytes were found, all were examined for enlarged spleens and for anæmia, but with completely negative results.

It is generally considered that the splenic index is a most reliable guide to a population's infection with malaria, but, if further investigations which are being carried out should confirm the above results, it would appear that the spleen is a poor guide in South China when searching for a reservoir of infection.

The question of the apparent racial immunity or partial immunity that exists in the Chinese race is an interesting one. Although the native of South China suffers as a rule such trivial ill-effects from malaria, it is very different with the northern Chinese imported into South China. A large proportion of the Hong Kong police are natives of North China, and these suffer heavily from malaria when stationed in the country districts of the New Territories, while their southern *confrères*, in similar conditions, remain apparently healthy.

No information about the converse is available, as there is no similarly-controlled population from South China living in North China. But in Shanghai the local Chinese do not appear to suffer from malaria to any appreciable extent, while the British troops know to their cost that malaria is extremely prevalent in the country districts of that city. This apparent immunity of the Shanghai Chinese was pointed out in the section devoted to Shanghai in the Report on the Health of the Army for 1927, and was again commented on in the Annual Report of the Deputy Assistant Director of Hygiene, China Command, for 1930. If such immunity from

malaria does exist in China, it would appear as if the strains of malaria in North and South China might be different, and that immunity which is present among northern Chinese in their own country does not protect them when they are exposed to infection in South China.

(*d*) *Types of Parasites.*

The only figures available are those derived from military statistics, which for the three years 1928-30 are shown in Table I :—

TABLE I.—STATEMENT SHOWING SPECIES OF INFECTING PARASITES FOUND IN FRESH CASES OF MALARIA IN HONG KONG, EXPRESSED IN PERCENTAGES OF THE TOTAL NUMBER OF FRESH CASES OF MALARIA OCCURRING EACH YEAR.

Year	*P. vivax*	*P. falciparum*	*P. malariæ*	Clinical
1928	40·95	50·00	0·43	8·62
1929	69·92	23·31	0·00	6·77
1930	45·45	48·05	2·61	3·89

These results are roughly what might be expected in a country situated on the northern fringe of the tropics.

In Shanghai, which is situated in latitude 31° 3′ N., *P. vivax* is by far more common, *P. falciparum* being of rare occurrence. This fact may have some bearing on the apparent loss of immunity on the part of the northern Chinese police who come to reside in South China, but no record of the species of infecting parasites among these policemen is kept.

V.—THE MILITARY MALARIA SITUATION IN HONG KONG.

(*a*) *Prevalence of Malaria.*

That malaria is prevalent among the troops in Hong Kong is evident from the following table, which shows the incidence of malaria for British troops for the decade 1921 to 1930. For the sake of comparison, the incidence for British troops in India during the same period is also given :—

TABLE II.—STATEMENT SHOWING ADMISSION RATIOS PER 1,000 OF STRENGTH, FOR MALARIA AMONG BRITISH TROOPS IN HONG KONG FROM 1921 TO 1930.

Year	Hong Kong			India		
	Fresh	Relapse	Total	Fresh	Relapse	Total
1921-1927	—*	—*	74·88	79·75	111·48	191·23
1928	89·7	9·3	99·00	43·20	48·10	91·30
1929	57·7	61·6	119·30	74·20	41·80	116·00
1930	35·7	20·9	56·60	—	—	—

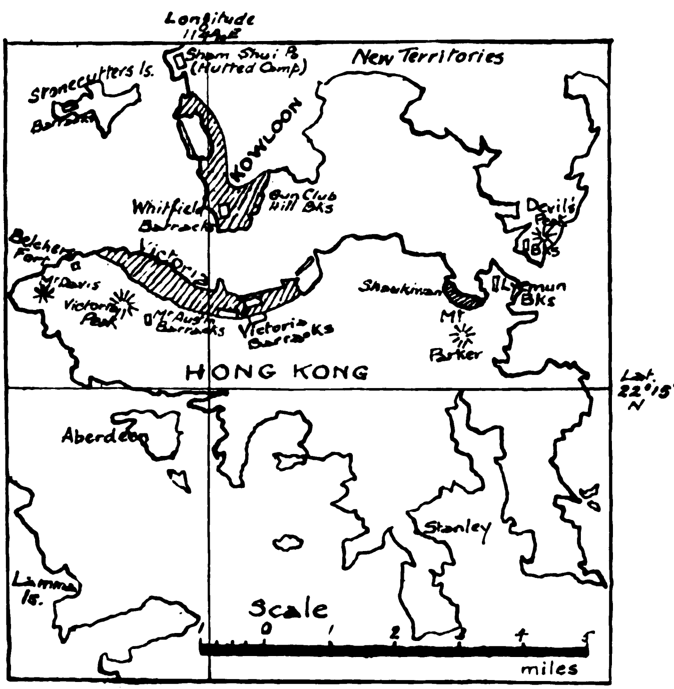
* Differential figures not available.

The unusually high incidence of fresh cases in 1928 was due to the fact that troops were sent, partly of necessity, into camp in October at Chuck On, a country district in the New Territories on the outskirts of Kowloon City. The camp was situated on the lower slopes of a small mountain range, which is scored by innumerable small streams, in all of which

A. maculatus and *A. minimus* breed freely. Numerous Chinese villages provided the necessary reservoir of infection. It was not possible to adopt adequate anti-mosquito measures, malaria quickly appeared, and the camp had to be closed; but not before the company occupying it had suffered most severely. The large number of relapse cases in 1929 was a corollary of the high degree of infection sustained by the troops during the previous year, and manifested itself chiefly as recrudescences among the troops who had occupied Chuck On in October, 1928.

(*b*) *Topography of the Barracks and Camps in Hong Kong.*

One thousand two hundred troops are quartered on the Island of Hong Kong, 2,650 on the Kowloon Peninsula and 200 on Stonecutters Island.



Map of Hong Kong.

The barracks housing these troops can be divided into two classes: those situated in urban areas, and those situated in rural or semi-rural areas. In the former category are Murray, Victoria, Wellington, Belcher's, Whitfield and Gun Club Hill Barracks, and in the latter Mount Austin, Lyemun, Stonecutters, Devil's Peak, and Mount Davis Barracks, and the hutted camp of Sham Shui Po. In addition troops spend certain months of the year in the training camps of Sun Wai, Lo Wu and Tai Lam, all situated in the heart of the country in the New Territories.

The incidence of malaria in the barracks and camps depends on one factor alone: the presence of *A. maculatus* and *A. minimus*. Where either,

or both, of these species are found breeding in the vicinity of a camp or barracks at or near sea-level, there malaria occurs.

The barracks in the urban areas of Victoria and Kowloon, affording no breeding places suitable for anopheles mosquitoes, escape malaria almost wholly, such very few cases as do occur being imported. Sham Shui Po, although in a suburban district, with extensive vegetable cultivation close to its eastern boundary, also escapes malaria; and it is noteworthy that *A. maculatus* and *A. minimus* are absent from this locality. *A. hyrcanus*, however, breeds freely in the slow muddy irrigation channels which flow through the gardens. Stonecutters Island provides only a very occasional case of malaria, and on Stonecutters *A. hyrcanus* alone of the anopheles has so far been found.

Mount Austin Barracks are situated near the top of Victoria Peak (1,500 feet) and in a suburban area, in which *A. maculatus* breeds in small, though definite, numbers; yet malaria does not occur. This absence of malaria is universal throughout the whole of the extensive Peak residential district. Devil's Peak and Mount Davis Barracks house small detachments, and again it is interesting to note that, although *A. maculatus* and *A. minimus* are found in their vicinity, yet, proportionately, very little malaria occurs in either. Both barracks are at an altitude of 700 feet above sea-level.

It is difficult to say why malaria is absent from the Victoria Peak district, and why it only occurs scantily at Devil's Peak and Mount Davis. It is just possible that in Hong Kong an altitude of 700 or 800 feet plays a very important part in the transmission of malaria. If this is so, the reason is far from clear.

At Lyemun Barracks, however, *A. maculatus* flourishes exceedingly, and in the three training camps both *A. maculatus* and *A. minimus* are evident in very large numbers. And in these four districts malaria is a constant menace to the troops quartered there. Thus the consideration of malaria among the troops in Hong Kong practically resolves itself into the consideration of Lyemun Barracks, and the camps at Sun Wai, Lo Wu and Tai Lam.

(c) *Lyemun Barracks.*

The Lyemun promontory guards the eastern entrance to the Hong Kong harbour and lies distant some five miles from the City of Victoria. It consists of a rocky spur three quarters of a mile long by half a mile wide, and some 200 feet high, jutting out into the sea; and with the aid of its neighbour, Devil's Peak, on the opposite side of the Straits, narrows the entrance of the harbour to 600 yards. Its back is flat, and on it are perched the barracks.

Its terrain on the eastern side consists of a series of valleys, gradually sloping down to the sea, and down each of which flows a rocky stream. As the main streams travel down the hillsides, they are joined by numerous subsidiary streams to form a regular branched network of watercourses, interrupted by occasional flat swampy areas. Such a terrain, amply supplied

with water which constantly seeps from the head and sides of each valley, forms an ideal breeding place for *A. maculatus*. The western slopes of the spur are much more precipitous, are not supplied with constant streams, and play a small part as breeding grounds for *A. maculatus*. Unfortunately, on the south-west the lower slopes of Mount Parker approach within a few hundred yards of the barracks. This land abounds in the breeding places of *A. maculatus*, and, to make it worse, lies outside the Military Reservation.

More important still, the populous Chinese town of Shaukiwan approaches within 200 yards of the barracks on the west. This town is situated at sea-level and straggles along the coast, partly at the foot of Mount Parker and partly at the foot of the west side of the Lyemun Promontory. It is also entirely outside the Military Reservation.

It will thus be seen that both the criteria necessary for the propagation of malaria are present: an extensive reservoir of infection and numerous potent vectors. The first of these factors is entirely outside military control, and the latter within that control only so far as the land inside the Military Reservation can be dealt with.

It has long been realized that any anti-malaria measures carried out on War Department land in Hong Kong can only hope to be partial in their effects so long as the land outside military control is swarming with infected anopheles. Unfortunately, there appears no prospect that any anti-malaria measures, of any sort whatever, will be undertaken by the Civil Authorities in the near future, if ever.

It is surprising that the malaria incidence in the past in Lyemun Barracks, high though it has been, has not been higher. One possible reason is that the Chinese dwellings are sited at sea-level, while the barracks are some two hundred feet above them; and the mosquito is loath to travel far or high, especially when it has a generous hunting ground and an ample supply of food in the shape of Celestial blood in Shaukiwan. But Shaukiwan at night is a potential malaria trap, and, unfortunately, the only road to Lyemun lies through its unattractive and insalubrious streets. Thus all soldiers returning from late pass are exposed to infection on their way to barracks.

Two reservoirs of infection exist in barracks—small but highly important. The Chinese servants who, of necessity, must live in barracks, and the troops themselves, a certain proportion of whom are bound to harbour gametocytes in their blood following relapses and recrudescences. And it follows from this that it is of very definite value to keep down mosquitoes on War Department land, even though the outside land may be swarming with them.

Lyemun presents undoubtedly the stiffest malaria problem in the Hong Kong area, and one of which there appears little hope of an absolute solution. At the same time, malaria can be kept within reasonable limits by the adoption of suitable anti-malaria measures. Lyemun also presents

by far the most important malaria problem, since in these barracks is located a considerable body of troops throughout the year who have to pass the most malarious season within the barrack confines, whereas in the training camps one can pick, to a certain extent, the less malarious times of the year for their occupation.

(*d*) *The Training Camps of Sun Wai, Lo Wu and Tai Lam.*

These three semi-permanent camps are situated in the New Territories, in the midst of rural surroundings.

Sun Wai and Lo Wu are within a couple of miles of each other, are close to the frontier, about 4 miles from the sea, and are approximately 23 miles by road from Kowloon City. Each can accommodate, under canvas, a battalion of infantry. Tai Lam is some 18 miles by road from Kowloon, a few hundred yards from the sea, nearly 13 miles from the frontier, and can accommodate, under canvas, 3 batteries of artillery.

The camping season normally extends from November 1 to the middle of March, and during this period all three camps are, more or less, continually occupied by troops undergoing their annual company, battery and battalion training.

The camp sites are, topographically, similar. Each stands on the gentle lower slopes of a range of hills a few hundred feet high, and each is closely encroached upon by extensive padi cultivation, which comes within a few hundred yards of the camp boundary. These rice fields, being intersected by countless slow-moving grassy streams and irrigation channels, and being flooded for nine months of the year, form ideal breeding grounds for *A. hyrcanus*. Within a few hundred yards of the southern flank of each camp flows a slow-moving river which winds its way through the padi fields to the sea. Along the course of the rivers there are countless grassy backwaters and small pools, at the edges of which *A. hyrcanus* breeds freely. Down the hills at the back, or northern flank, of each camp run the small rocky ravines, so typical of Hong Kong topography, each containing its stream of clear sparkling water, and in each of which the larvæ of *A. maculatus* and *A. minimus* find their favourite environment. Scattered over the adjacent countryside are numbers of small Chinese villages and collections of houses, many of which approach within a hundred yards of the camps.

The population occupying the villages has long been known to be malarious, and a splenic index, performed recently by the Malariologist to the Hong Kong Government on thirty-three children, showed 27 per cent with enlarged spleens. This, as has already been indicated, is an abnormally high splenic-rate for southern Chinese, and may fairly be taken as an indication of very high infection. It has not been possible to examine the blood of these villagers for parasites, as they refuse examination.

Indeed, it is with difficulty that they can be persuaded to permit their children to have their spleens examined.

Thus, as at Lyemun, the vectors and the reservoir of infection are present. The latter is not under military, nor indeed any, control whatever, while the former is only under complete control so far as War Department land, which consists only of the actual camp sites, is concerned. A limited control of all hill streams within 1,000 yards of the camps has recently been acquired, but the padi and its irrigation channels are still absolutely forbidden country to military anti-malaria measures. Again, as at Lyemun and for the same reason, anti-malaria measures can only hope to be partial.

The saving graces as regards the occurrence of malaria are two. First, and in contradistinction to Lyemun, which is in occupation throughout the year, the camps are only occupied during the four less malarious months of the year. As a counterbalance to this, however, they are occupied by many more troops, the proportion being in the neighbourhood of ten to one. Second, the padi, although swarming with *A. hyrcanus* larvæ, is almost innocent of those of *A. maculatus* and *A. minimus*. Even so, the former saving grace is not absolute, as it is not possible, for military reasons, to occupy the camps only during the optimum period of December, January and February.

All troops cannot, for reasons of internal security, be absent from Hong Kong Island at the same time. Thus their stay in the training camps has to be fitted in to the best advantage possible, and it is very nearly impossible to exclude troops from one or other camp in November or even late October, periods at which the incidence of malaria is still high.

As at Lyemun, the Chinese servants employed in camp, and who live within the camp perimeter, form a secondary, but important, reservoir of infection.

Table III shows the incidence of malaria at the three camps during the seasons 1928-29, 1929-30, and 1930-31. Since bodies of troops of different strengths occupy the camps for varying periods throughout the camping season, the figures have been expressed as ratios per 100,000 of fresh cases of malaria to the number of men-camp days throughout each season. By this method a comparison between the incidence of malaria for the different seasons can be made.

TABLE III.—STATEMENT SHOWING ACTUAL ADMISSIONS AND RATIOS PER 100,000 OF "MEN-CAMP" DAYS FOR FRESH CASES OF MALARIA OCCURRING AT THE THREE TRAINING CAMPS DURING THE SEASONS 1928-29, 1929-30, AND 1930-31.

Tai Lam Camp.			*Sun Wai and Lo Wu Camps.*		
Season	Admissions	Ratio per 100,000 men-camp days	Season	Admissions	Ratio per 100,000 men-camp days
1928-29	84	461·9	1928-29	89	119·0
1929-30	31	200·0	1929-30	65	102·1
1930-31	36	238·4	1930-31	9	13·0

(e) *The Effect of the Exigencies of Training on the Incidence of Malaria.*

In the course of their military training it is necessary for troops to perform night marches, company and battalion night tactical schemes, and the more ambitious brigade strategical exercises. During these operations which have to be performed, in the absence of any alternative, over highly malarious country, the troops must spend the night, or part of the night, in the open, and of course the anti-malaria measures which are possible under such conditions are not of great value.

Naturally, the less malarious season is always chosen for such training, but even so, this factor provides a definite breach in any anti-malaria bulwark that can be constructed round the soldier and certainly allows some extra malaria cases to leak through. It is unavoidable; one endeavours to console oneself with the philosophical reflection that one cannot make omelettes, in the shape of trained soldiers, in a highly malarious country, without breaking eggs in the guise of some extra cases of malaria.

(*To be continued.*)

THE DISPOSAL OF ANIMAL LITTER IN THE FIELD.

By Major T. O. THOMPSON,
Royal Army Medical Corps.

The satisfactory disposal of animal litter in the field often presents great difficulties, especially with forces halted for indefinite periods, or successive columns using a series of camping grounds in rotation. Neglect of adequate disposal always results in epidemics of flies and consequent fly-borne infections.

The difficulties are enhanced under adverse weather conditions and with a paucity of personnel in the transport units concerned.

The following account of a trial of methods of combustion, using an oil-and-water fire, carried out at the Army School of Hygiene, may be of interest to those who are called upon to deal with this problem.

These trials were conducted on official request as a part of the normal work of the School and this report should be considered as the combined work and ideas of the personnel concerned although published under one name.

We maintained the definite aim of trying to produce a method which is practical and possible for unit personnel, with material which is likely to be, or can readily be made, available.

Improvisation is taught to all classes in the School, but in this particular we aimed at more than mere improvisation; we hoped to devise a method, making use of material forming part of the actual field equipment, which would be a normal procedure for the units concerned when a mobile force is being collected.

On a number of the days when experiments on burning litter were carried out the weather was wet, sometimes exceptionally wet. There was at times a favourable wind. But on the whole, the conditions were not particularly favourable.

Horse litter was used. This was stacked in a heap and on dry days was watered freely before use. The quantities are given in barrow-loads for actual experiments. The barrow-loads were measured out and approximately 15 to 17 barrow-loads equalled 1 G.S. wagon-load, and 3 G.S. wagon-loads equalled the litter from 100 horses daily.

Combustion of Horse Litter.

The following experiments were carried out :—

(1) *Windrows on Ground.*—Litter was heaped in rows, about one foot high, in the direction of strong prevailing wind : (*a*) 3 loads with 0 pints crude oil; (*b*) 3 loads with 1 pint to each barrow-load; (*c*) 3 loads with 4 pints to each barrow-load.

Lighted in the ordinary way at windward end and in two other places.

Result: Indifferent. Very little appreciable difference with heavy dose of oil.

(2) *Bhoosa-Baling (Hoop Iron) Rectangular Baskets.*—This type of incinerator is used on the Indian frontier and nests of three can be carried at the bottom of an army transport cart without interfering with loading capacity. Experience with them has shown that they require constant stoking, and also tend to drop a considerable amount of unburnt material with the ash: (*a*) 2 loads with 0 pints crude oil to barrow-load; (*b*) 2 loads with ½ pint crude oil to barrow-load; (*c*) 2 loads with 4 pints crude oil to barrow-load.

Good wind blowing. Some rain.

Result: Without oil, the fire goes out unless stoked; some unburnt material is dropped.

With ½ pint of oil to load burns better, but combustion still slow; with 4 pints to load burns well, but 7½ gallons of oil to the wagon-load are obviously impracticable.

An oil and water fire on a flash-pan was used under the litter in a basket. This gives good combustion, but unless oil and water are kept going the result is the same as with untreated litter.

(3) *Sentry-Box Incinerator* with four sloping platforms and bottom plate: (*a*) 3 loads with 0 pints oil per load; (*b*) 5 loads with 1 pint oil per load.

Result: Quite good, but very slow combustion oiled litter burns rather better than plain litter. Still burning two mornings later.

(4) *Sentry-box Incinerator*, 5 feet 6 inches high: (*a*) 2 sloping platforms and oil-water flash-pan under; (*b*) 1 sloping platform and flash-pan; (*c*) 2 sloping platforms and flash-pans, but with size of platforms reduced to allow plenty of space for litter to fall.

Three loads each time with no oil. Oil fire used for starting and re-heating only. There was heavy rain twice during burning.

Result: Quite good. Starts readily, burns well and keeps going, but process is too slow and limited for large quantities. It would require probably 5 sentry-boxes plus 1 flash-pan fire set per 100 horses.

(5) *Ground Trenches.*—(*a*) Trench 9 feet long, 1 foot wide, 6 inches deep sloping to 2 inches, with splay mouth, covered with expanded metal in form of inverted V over whole length of trench.

Six loads of plain litter (litter mostly bedding).

With flash-pan fire at mouth for thirty minutes.

Whole burnt very rapidly; heat so great that expanded metal support V collapsed.

Six more loads and then three more loads added.

Whole burnt out next day. Strong wind, heavy rain through night.

Result: Fifteen loads consumed at the expense of ½ gallon of oil.

(*b*) Trench 6 feet long with splay mouth, 2 feet wide, 9 inches deep,

sloping to 6 inches, expanded metal laid flat on supporting bars: six loads of plain litter; flash-pan fire at mouth for thirty minutes; burning well, three more loads added.

Results: Burnt out next day. Wind and rain during night. In the longer trench material burns better; in the wider trench bars were softened with the heat and the whole mass sagged downwards.

(6) *Cross Trenches with Expanded Metal and Bars.*—Each trench has a splay mouth. The trenches were as follows: (*a*) 8 feet long, 1½ feet wide, 9 inches deep sloping to 18 inches; (*b*) 8 feet long, 1¼ feet wide, 9 inches deep sloping to 18 inches; (*c*) 8 feet long, 1 foot wide, 6 inches deep, level; (*d*) 8 feet long, 1½ feet wide, 6 inches deep, level.

Oil flash fire was applied for fifteen minutes in rotation to (*a*) to (*d*).

Result: (*a*) Burnt three loads in 1 hour and 3 more in 2 hours more; (*b*) burnt 3 loads in 2 hours and 3 more by next morning; (*c*) burnt 3 loads—not complete next morning; (*d*) burnt 3 loads—not complete next morning, but wind against this trench.

Conclusion: A deeper and wider trench is definitely better, and space at the junction of the trenches is probably desirable.

(7) *Cross Trench with Expanded Metal on Bars.*—Each trench had a splay mouth, was 9 feet long, 1½ feet wide and 1½ feet deep. There was a central space 3 feet wide and a cresol drum packed with earth was placed to support the bars.

Four loads on each trench and 2 extra for centre equals 18 loads.

Oil flash-fire was applied to all mouths, except on the leeward mouth for ten minutes. Started 09.15 hours. Stoked again and flash-fire repeated for five minutes for each trench at 11.00 hours. Stoked again and flash fire repeated five minutes for each trench at 14.00 hours and 15.30 hours.

Result: 45 barrow loads (i.e., 100 horses) burnt through in 7 hours and completely burnt out next morning in 23 hours.

Repeated with fresh supply of very wet litter.

Thirty-six loads not properly burnt out in twenty-two hours; but initial firing was not properly done, too great a bulk was put on at the start. A subsequent trial proved quite successful.

Conclusions.

The simplest and yet most efficient method requiring least attention, and employing the most portable apparatus appears to be:—

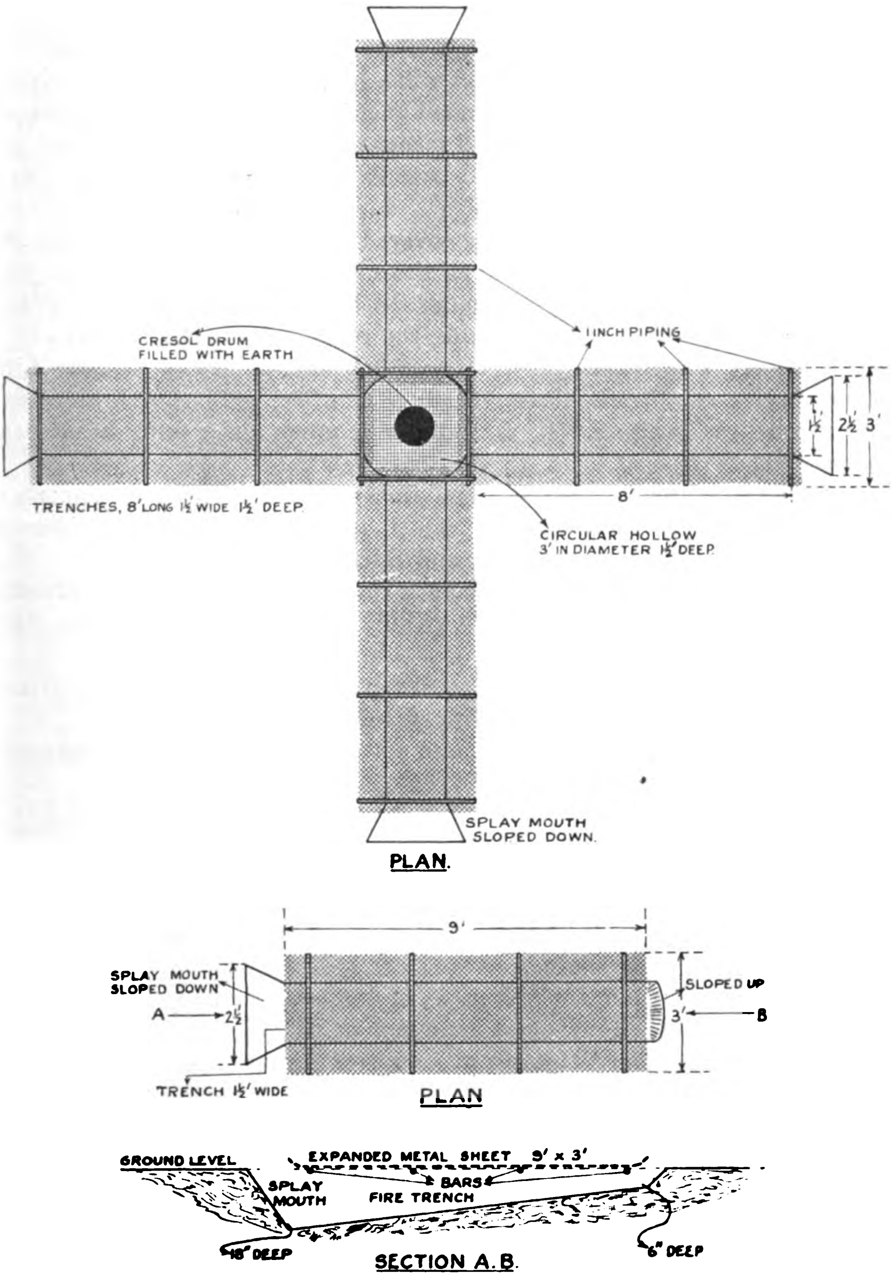
(*a*) *For Smaller Quantities* up to sixty horses:—

Single trenches, with splay mouth, facing the wind, 9 feet long, 1½ feet wide, at least 9 inches deep (prefer 1½ feet) sloping to 6 inches at leeward end.

Nine feet by 3 feet sheets of expanded metal, 2-inch mesh, and four pieces of 1 inch piping 3 feet long for each trench.

One oil and water flash-pan fire apparatus.

CROSS TRENCH INCINERATOR.



SINGLE TRENCH.

FIG. 1.—Cross Trench: *Materials used.*—Expanded metal (2-in. mesh): for trenches, 4 pieces of 9 feet by 3 feet; for centre, 1 piece of 3 feet by 3 feet. 1 inch piping, sixteen 3-feet lengths. 1 cresol drum.

Single Trench: Expanded metal; (2-in. mesh): 1 piece size 9 feet by 3 feet. 1 inch piping, four 3 feet lengths.

Weight about twenty-five pounds per trench and five pounds for fire apparatus.

(*b*) *For Larger Quantities. One Cross Trench per* 100 *horses.*

Cross trench: 8 feet long, 1½ feet wide, 1½ feet deep each; 3 feet circular space in centre; 4 pieces of expanded metal, 9 feet by 3 feet; 1 piece of expanded metal 3 feet by 3 feet; 16 pieces of 1 inch iron piping 3 feet long. An empty cresol drum to be packed with earth as central support. One oil and water fire apparatus.

Method.—Each trench is lightly covered and also the centre of the cross trench. The oil fire is applied at the splay mouths in rotation. The whole is then packed up with more litter up to about 2½ feet high. Stoking can be carried out by shaking the pieces of expanded metal.

Note.—(1) The litter was very wet but had plenty of straw. Litter under service conditions abroad (Indian frontier) gives much more dung and much less bedding. It is, however, much drier and more easily burned.

(2) The heat inside is intense and the expanded metal and supports are bent considerably, so that greater width of trench than 1½ feet does not appear advisable unless heavy bars and thick metal are to be used.

(3) Expenditure of oil in this way is limited to starting and refreshing the fires, about three-quarters of a gallon for every thirty minutes with a really good blaze going.

(4) Removal is easy. The bars are pulled out, the expanded metal dragged aside and the contents tipped into the trenches.

(5) Five expanded metal strips and sixteen bars should easily be packed into the bottom of a cart.

Combustion of Human Fæces.

When portable destructors are not available the following method was found after several trials to be the most satisfactory with the type of material likely to be available.

A sentry-box incinerator was made of 4 sheets of corrugated iron, 4 feet 6 inches high, fastened by eight punched holes and wire loops along each side. By undoing the fastening at opposite corners, pairs of sheets fold together for transport. There is a draught hole 12 inches by 6 inches at bottom of each, also an entrance and feed hole 8 inches by 8 inches and a supporting bar for an oil and water flash-pan above the level of draught holes.

There are also two perforated corrugated iron shelves, the lower sloping about 15° just above the flash-pan, the upper at 20° on the opposite side and above the other. These are hinged at the upper edges by wire loops through holes and supported at the lower ends by two removable bars. The flash-pan extends just beyond the lower edge of the lower shelf and can be readily removed for cleaning.

MODIFIED SENTRY BOX INCINERATOR.

ADAPTING OIL AND WATER FUEL FOR THE DESTRUCTION OF EXCRETA.

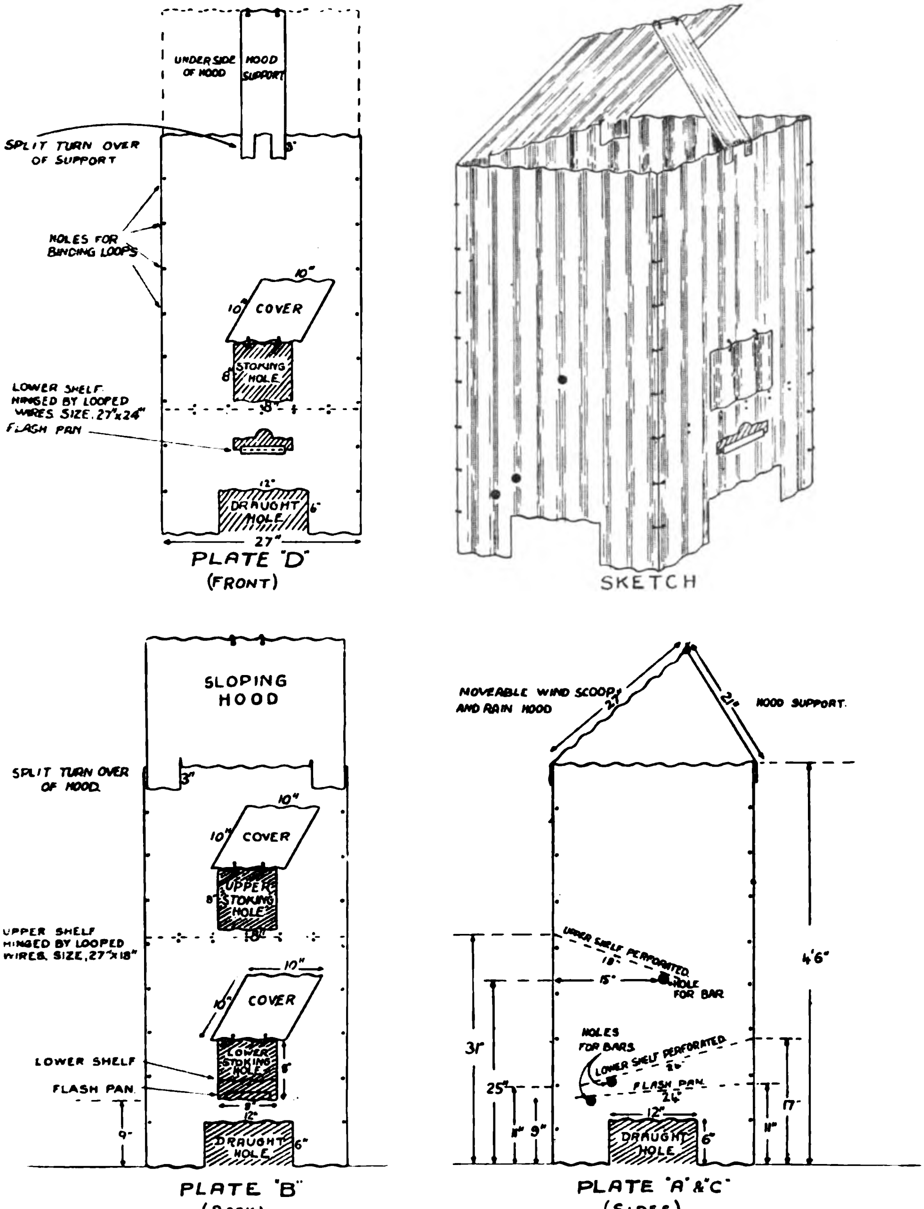


FIG. 2.—Both shelves are perforated with half-inch holes punched upwards; one hole per 3 square inches. For transport supporting bars are withdrawn and shelves lie flat in corrugations of plates B and D. Covers to stoking holes are hinged by wire, and should lie flat in corrugations. The flash pan is not fixed but rests on plate D and its support bar.

Weight about 110 lb.

A stoking door with hinged cover is placed conveniently above the upper edge of each shelf.

A movable wind scoop and rain shield can be made from a single piece of corrugated iron fitted on top.

Litter is set well alight by the oil flash fire and the contents of latrine pans in which litter has also been previously placed are emptied on to this. More litter is packed over and the fire made to burn up well and then left.

Only small quantities, three buckets each time, were tried, but combustion was complete with absence of offensive smells. Consumption of oil is one gallon for each hour of burning the flash fire; say, 1½ gallons per day per box as a very adequate allowance for good fire for 100 men. This number is a very low estimate; if latrine pan contents are added in detail as the pans are used, the amount burnt would be at least doubled.

The sentry-box is readily portable. It can be made to fold in two double sections with shelves *in situ* and all the bars can lie between the sheets.

The weight of each sentry-box is about 110 pounds and that of the oil container and flash pan about seven pounds.

Conclusions.

(1) Animal refuse from as many as sixty animals can be dealt with satisfactorily on single trenches with a grid of expanded metal supported by cross bars.

(2) For larger numbers, cross trenches with similar grids and supports appear most satisfactory.

(3) Excreta can be dealt with satisfactorily in the manner described.

(4) The apparatus is simple, can be made up by unskilled personnel, and of material which should be obtainable. It is readily portable.

(5) The oil-and-water fire is by far the most satisfactory and economical method of getting the necessary heat and combustion going.

The following R.A.M.C. personnel took part in the trials, and much credit is due to them for the work done: Cpl. T. W. Banks, Ptes. C. W. T. Monk and H. A. F. Richardson.

Pte. B. G. Duggan drew the diagrams and plans.

Our thanks are due to Lieutenant-Colonel G. S. Wallace, O.B.E., R.A.M.C., for the help he gave in carrying out the work.

THE DOCTOR'S WAR.

By D.A.D.M.S.

(*Continued from vol. lvii, page* 441.)

Again the war was becoming stabilized and we started erecting things called Horsfall incinerators, large iron erections that would deal with all sorts of human, and otherwise, waste products, and so save the ground from continual fouling. The only trouble about these iron monsters was that they looked very like big guns, and the Boche did not like the look of them at all. You can visualize some hard-working soldiery stoking and feeding one of these brutes, when along comes a German aeroplane spotting for heavy guns. Below he sees a group of men round a gun, so he thinks, and he throws out a smoke signal. A short interval, and a salvo of shells falls round the incinerator. Hasty dispersal of sanitary personnel and finish of work for that day.

The divisions on our left were suddenly attacked by enemy carrying flame-projectors, flammenwerfer, and lost some trenches. Accounts described jets of burning liquid pouring into the trenches and men being burned to death. On examination of wounded brought in, there was little evidence of burning liquid having reached the troops. One man had burns on the chest, and one man had signs of burns on his clothing, seemingly caused by pitch or tar-like substance. It was a surprise effort by the Boche, and the sudden appearance of flaming clouds of black smoke advancing caused a minor panic, and again the unexpected produced alarm. But it was quite a minor affair and I do not think this method of warfare ever came to much. However, it meant that the trenches lost must be regained, and it fell to our division to take over the job. Two brigades were selected for the attack, and were moved into position. The attack was to be preceded by a bombardment to commence at 2.45 a.m., and infantry to assault at 3.15 a.m. precisely. All medical arrangements were carefully planned out and a double line of evacuation of wounded arranged for. Suffice it to say the action was a success, but our casualties were 39 officers and 1,110 men wounded. Including killed, the total loss was nearly 2,000. A costly little battle.

The incidents that occur to me were the following: Visiting Battle Headquarters in the Ramparts at Ypres. Into that massive old wall casemates had been built in days long past. These casemates now served as divisional headquarters. Except for a direct hit by a very big shell, they were safe. Our attack had stirred up the enemy and Pop., Vlam. and Ypres were getting it hot. Vlam. and Ypres were shelled by those intimidating seventeen-inch shells. Great brutes that rolled and thundered through the air for all the world like an express train approaching, and then one

stupendous ear-splitting crash, and a whole building tumbled into ruins, or a hole was made in the road or fields like the result of a small earthquake. The town hall at Vlam. was hit by one of these monsters and simply fell down in one heap. I spoke to the military policeman on duty directing traffic through this intensive shelling and asked him about the shell that brought down the town hall. "Yes, sir," he said, "I saw it myself. I had the luck to be standing quite close when the shell hit." There are different views of luck. Ypres itself was a smashing, crashing turmoil. Clouds of dust rising in the air lit by flame jets of bursting shell. I went through in a car sitting beside an officer who turned up the collar of his coat as if it was raining. He said he felt much safer that way. I found the G.O.C. in his casemate reading a sevenpenny novel. He had done his job and could only sit and wait. But there in front of Ypres the P.B.I. hung on, stuck it out, and the gunners blazed away day and night for three days and nights. French batteries were helping us, and one easily distinguished the soft "plop" "plop" "plop" of the seventy-five as compared with the sharp "crack" of our field guns. The French were firing gas shells and were jubilant of their results. They said the gas contained in the shells would blind any one in its striking area. I suspect it was just tear gas. Their batteries had arrived at Vlam. some days ago. They had cheerfully dumped a pile of gas shells in the chateau grounds, pitched a sort of gipsy camp, odd shelters, horses picketed about anywhere, old carts standing about, harness all dirty and tied up with odds and ends of rope, a regular raggle-taggle show, but the guns were all right. They were clean and in perfect order, and when the batteries moved up east of Ypres and started to shoot, my word, they were all right!

For the first time in our division some of the infantry wore the tin hats so well known in later times. There was a story that they led to trouble. A party bombing along a trench came into contact with those tin-hatted fellows and took them for Germans!

The medical arrangements worked well; even during the day-time motor ambulances dashed through Ypres and out to Potijze and St. Jean. A constant stream of walking wounded came back to the asylum dressing station in Ypres or along the tract to Kruisstrat. At night ambulances pushed out to Sanctuary Wood and cleared that section. The R.A.M.C. casualties were three killed and seven wounded. I saw two wounded men who were found and brought in on the fourth day of the battle. This is the story. In the initial advance they got into a German trench and one man was promptly shot through the thigh. The bone was smashed; he was helpless. His pal helped him into a dug-out and dressed the wound as best he could. During this time our troops had gone on and come back again. Consequently the trench the two men were sheltering in was now between the opposing forces. Both sides were machine-gunning and shelling as hard as they could, and all this trouble was lashing about this bit of trench where our two soldiers

were crouching in the dug-out. They could not get out, it was sudden death on the top, and anyway one man was completely helpless. So there they remained for four days and four nights. As is usual on these occasions of intense danger, food and drink soon became the most important question of all. The sound soldier scrounged round this little bit of a trench, it was probably a German listening-post before the attack, and picked up a biscuit or two and a little water in cast-off water-bottles. The drinking water petered out and they were faced by the terrors of thirst. On the fourth night they managed to attract the attention of one of our listening parties and were brought in. Both were indescribably filthy, emaciated, and done. Their lips were sore, excoriated and crusted. They told me they drank their own urine on the last day. But when I saw them they were sitting up in their stretchers and eating, of all things, great wedges of bread thickly spread with jam! The M.O. told me the first thing they asked for was tea and bread and jam!

It was during this battle that the Brigand Ambulance appeared. In true trans-Atlantic fashion, careless of orders or instructions, a dashing American doctor belonging to a Belgian field ambulance on our left came in and joined in the scrap. He heard noises of strife and battling somewhere around Ypres, so he said "At-a-boy," cranked up his ambulance, and just came along. He dashed into Ypres and quickly picked up a load of walking wounded making for the asylum dressing station. He whisked them off to his Belgian field ambulance in the next county, so to speak, and came back for more. How many British wounded he pinched to scatter about in Belgium I do not think we ever knew. I strongly suspect this episode is the true reason for many of those plots of many books, when the hero, long described as "wounded and missing," turns up in 1918, after a long period of inactivity as batman to the nursing sisters of a cosmopolitan medical unit. However, he was a gallant soul, and I am sure I would not care two hoots how I got away from Ypres on such a day, or where anyone with a motor machine of any sort took me, so long as I *did* get away quickly.

The fighting died away gradually, and we came back again to peace-time war. Troops now came out of trenches to rest in hutments scattered about in the woods. I think our big camp was known as A 30. It was not much of a place. The huts were primitive and loosely put together, and they were cold, draughty places. But everything being a matter of comparison, they were palatial compared with a wet ditch, so-called a trench. However, authority was not inclined to spend too much in titivating these camps, and rightly so, as their life was a most precarious one, and we might up and leave them for ever any day. Of course, we did not leave them until 1918, but nobody could tell that in 1915! We discussed with the staff the question of building "dug-outs" for advanced dressing stations and aid posts instead of utilizing remnants of ruined villages for this purpose. The staff view was against this proposal. They said: "If

you build anything the enemy can see he will at once shell it to rags, and then where are you?" This answer was tosh, as of course we soon imitated the Germans by building concrete pill-boxes all over the place. We fitted out a place at Proven, smelly old Proven, for a divisional rest station, i.e., a place where soldiers could "rest" from immediate battle for a few days as a means of saving their minds and bodies from a break-up. Soon those remarkable Belgian workmen put up "wattle and daub" huts for us, just wattle and mud, but quite cosy and easily warmed. This also produced a car journey to Dunkirk to look for stoves for the huts, and to buy shrimps for the mess! Dunkirk struck me as full of peace and harmony, until one was told to look at the damage done to the fine old church by the German long-range guns up the coast.

It was about this time we gave up our palatial bedroom in the chateau. A battery of sixty-pounders had established themselves in the grounds, and between the firing during the night, and the German shells coming to look for them, we found it very unrestful. So some brave souls who were not afraid to say how they funked sleeping in this great bare exposed building put up a scheme for building "dug-outs" in the garden, and so we did. It was extraordinary how that descent a few feet under ground deadened all noise, and also gave one the same sort of feeling of security one got when stepping down from the top of the world into a trench system. We also gave up the little hut mess we had been feeding in, and we moved into the gardener's cottage at the back of the chateau. As a matter of fact we moved nearer the enemy, but to an unpretentious little house tucked away in the trees. Here also we had madame of the gardener and two daughters to help the housekeeping and catering. I had a little sleeping hut at the side of the cottage, but later moved into a little attic bedroom in the house. The Admiral ran the mess, and did us well.

I have told you of our distinguished interpreters, the French Count and the Belgian Baron. In our mess we had the Count, a handsome lad. But he had rather an obsession about "sport," or rather he thought all Englishmen wanted to talk "sport" all the time. So after dinner he would switch on to his so dear subject. The Admiral was terribly naughty about it. In a careless vein he would turn to me and ask me how the salmon fishing in the canal was getting on. Had I heard the Brigadier had landed a twelve-pound salmon before breakfast that morning? The canal in question being that unspeakably filthy sewer smelling its way round Ypres. Our gallant Count did not foregather canalwards, he had no reason to, and our talk to him pictured a limpid salmon river. Then the Admiral would discuss shooting in all parts of the world. The joys of hunting the jaberwock in New Zealand, and the quangle-wangle in Australia. Any old tale the Admiral's inventive brain could produce. Perhaps it was not quite fair, but it kept us all amused. The Count was also a perfect beau sabreur, immaculate as to uniform, complete and shining. One day his trusty batman lit his nice little oil-

stove in his dug-out as the Count was having an afternoon doss. At tea-time a black object staggered into the mess, choking and spluttering. Face and hands begrimed, and the beautiful sky-blue all greasy and stained with nice fat oily smuts. The stove had smoked furiously, the while the warrior slept! I think our Count was typical of his race; he bordered between high hopes of instant victory and periods of intense depression. We noticed these moods followed his fairly frequent visits to Paris and the news he gathered there. Our Belgian Baron was a nice little man. He told us many interesting tales of his time in Brussels under German domination. He had nothing to complain of and he got away quite easily. The strange thing was that his mother remained on in Brussels, and he several times crossed over to meet her in London. The Germans made no objection to this during the first year of the war, and his explanation was naive enough. "You see," he said, "the German has great respect for those of good family, and my mother, being of the aristocracy, made things easy."

How plucky was madame of the gardener and her young daughters. When shelling was acute the three would gather in the door of the cottage and give forth excited "la-la's" as shells whistled and burst in the grounds. It was still remarkable how the chateau stood there practically undamaged. The Count said the Germans respected it as being the house of one of good family. I think some German commander had issued an order that the chateau was to be preserved for his own august reception when the time came to drive the English away from Ypres.

In the field north of us a battery of sixty-pounders had taken up their abode; the O.C. was a very cheery garrison gunner of the old days, and he paid us frequent visits. His chief object in life was to knock out "Whistling Percy," a German high-velocity gun fired from the Houlhoust Forest. This extremely unpleasant gun sent shell travelling at terrific speed and the shell arrived immediately, so to speak, on the bang of the gun. It was bang—whee—crash in a few seconds. It certainly gave you no time to worry "where did that one go" sort of thing. It was hit or miss without the pain of waiting for something to happen. Our friendly gunner used to get up a special shoot to down "Percy," aeroplane spotting for him and all in order. After the shoot he would dash over to see us with the good news that Percy had definitely been knocked out, not a doubt about it, the gun emplacement was seen to go up in one tremendous sheet of flame. We were overjoyed at the news and showered congratulations on the gallant gunner. Hardly had he left our cottage when, with a bang—whee—crash, Percy arrived. After the third or fourth time of hearing of the extermination of Percy we grew sceptical, and the gunner Colonel rather avoided the subject. Instead he spoke bitterly of trans-Atlantic shells he was now using. One or two prematures landed on the roof of the Breilen Chateau, and hard things were said over the 'phone.

One of the most important of our medical units was the field ambulance workshop; on it depended the running of all the motor ambulances, and

the strain on them was enormous. They had to contend with roads torn by shell fire, driving by night in the dark without any lights, and the effect of shell-fire on the cars and drivers. On one day alone two cars were knocked out, five drivers and R.A.M.C. orderlies severely wounded. The ambulance cars were the only form of mechanical transport to go through Ypres to the regimental aid posts at La Brique, St. Jean, and Potijze. All regimental supplies went up on the horsed transport of the unit, and though one illustrated London paper published a picture showing R.A.S.C. motor lorries drawn up behind the trenches, while intrepid R.A.S.C. men ran backwards and forwards with rations which the infantry took with one hand as they fired machine guns with the other, it was not a very accurate picture. It was a great blessing for the wounded to be snatched away from the battle front by the quickest possible method, and it is rather remarkable to remember that a man wounded at 9 p.m. on the Monday would be driving away from Charing Cross at 2 p.m. on Tuesday.

There has been a slight change-over in the line the division was holding, and we took over the prison in Ypres as an advanced dressing station, and the mill on the Menin Road as another A.D.S. The prison had excellent cellars or dungeons, well under ground, and safe from everything but a seventeen inch shell. There was a courtyard at the prison, and a motor ambulance stood there day and night as an emergency car to be called upon for urgent help wanted at one of the regimental aid posts.

One afternoon when the city was getting an intensive shelling, the medical staff in the prison cellars heard a crash overhead and felt a shaking and quivering of the cellar roof. When they came up the motor ambulance was in an exceedingly crumpled condition, having received the best part of a direct hit. Needless to say, the driver and orderly were not sitting in the car when the shell hit it. That heroic and romantic individual, the Town Major of Ypres, had his quarters in the prison. I suppose it was natural he should be domiciled there. The duties of a Town Major in Ypres were arduous and varied, and the most unpleasant one of all was to issue forth into the streets to supervise the direction of traffic when shells were falling fast and everyone else was scattering off to cover as fast as possible. It was said that the term of service of a Town Major averaged about one or two months. He was soon killed, wounded, or shell-shocked. At one time the office was filled by a medical officer, it being thought that his medical training would have so hardened his nerves that supervising the removal of mangled animals and humans would not upset him. As far as I remember, the medical officer put in for leave due to him and quietly faded away to his legitimate work on return, wise man!

As the winter of 1915 approached the mud of Flanders began to assert itself, and many references appear of endeavours to provide "duck-boards," and push on with hutments. Pop. is the only town in this dismal salient available for billeting the troops, and Pop. is no health resort. Any sign of activity on our front brings a "strafe" on the town. This means that tired

infantry, back for a four days' rest, are turned out in the middle of the night and marched out of the town to get them away from the shelling.

Things were lively again at Potijze, the chateau was badly shelled, sixty-six wounded, and the road so broken up that we could not get ambulance cars up, and wheeled stretchers had to be used.

Winter and wet means trench feet, and all the work done in 1914 commences again for 1915, but we are more prepared for it now and everyone understands it better, but nothing can compete with continual wetting of feet and legs, and the sick-rate begins to mount. At one of our corps medical meetings the prevention of this trench foot condition was discussed. The experts from G.H.Q. were helpful, but not well-informed on actual conditions. When the Corps D.D.M.S. drew them a word-picture of a listening-post standing up to their thighs in mud and water for twenty-four hours, they understood it better. One battalion reported that their trenches were so flooded that they were unable to cook or boil water for six days. The men looked worn and tired from intense discomfort and want of sleep. I frankly do not know how they stuck it. It was almost beyond comprehension that civilized human beings could put up with such a life, even if the war side of it was struck out, but to combine this dog's life with the constant risk of death from thundering shells and spitting rifle bullets was asking too much of any man. And yet those splendid fellows stuck it, groused a bit, and forgot all about it as soon as they were out in relief and could get dry and warm again. But do not, for God's sake, imagine I am trying to make out they did not suffer. To this day I can see that long column of men trudging slowly along the muddy pavé towards Ypres, on their way "up" again, loaded down with war equipment, faces grey and strained, tired and weary. Not for them the talkie war pictures of the screen, with the soldiers singing cheerfully, Jeanette and Lucille tripping along beside them and waving fond farewells, while the canned music grinds out Tipperary.

On November 14 our Divisional Commander leaves us to take over a Corps, and I see the pathetic entry: "I am now the only officer of the Divisional Staff left as it came out from England in September, 1914."

The evacuations from the division for the period June 14, 1915, to November 6, 1915, are as follows: Wounded, 4,225; sick, 4,080. Up to the present this war has upset calculations made on events in previous wars, in that the wounded are in excess of the sick. In all former wars it was the reverse, the sick greatly outnumbering the wounded. This is attributable to the increased deadliness of modern methods of war, and the effect of long-continued health propaganda in the Army, teaching the officers and men to understand and value the care of their own bodily health. I venture to suggest to you, as the lawyers say, that if the hygienic spirit of the British Army had not been raised during the period 1902 to 1914, the sick return would read for this one division 20,000 instead of 4,000, and you can work it out for yourselves, as Stanhope did about the platoons in the whole British Expeditionary Force.

Here I went on eight days' leave, and returned one day late as the boat from Folkestone was held up on account of rough weather. That was rather a joke. We were told at Folkestone we could stay in the hotel there or go back to town for the night and come down again next afternoon. Twenty-four hours was twenty-four hours in those days. I wired my wife to meet me in town. We did a theatre, and I got my extra day. A few days after my return I went off to Corps to act for an officer going on leave. It was a pleasant change from our muddy surroundings at Vlam. to be in the peace and quiet of a chateau in extensive and untouched grounds. Everything in life is comparative. I thought this job would suit me very well, comfortable, safe, one could sleep o' nights, but I discovered the man I was relieving was completely fed up with it. A few days after my arrival at Corps, I went off to bed for that good sleep at an early hour. Woke up at 5 a.m. to hear a furious bombardment going on, wondered what it was, but no news came through. About 8 a.m. heard that the Germans had launched a gas attack on our front at dawn, but failed to follow it up by any attack. However, it spread into three days of heavy shelling from both sides, and casualties were heavy. The gas was chlorine mixed with the deadly phosgene. The latter is horrible stuff; having a delayed action on the heart, it strikes men down hours after they have escaped from the gas. There was one instance of a young officer who came down from the front line at 4 p.m. that afternoon to see the M.O. at the aid post, and as he sat talking he suddenly collapsed and died. But beyond giving us a nasty time, the Boche got nothing out of it, and we retaliated on him with every gun we had. It was estimated after the action that we had 607 gas cases, and of these twenty-four had died. Vlam. suffered severely during the last three days, the seventeen-inch shells were turned on the village and did a lot of damage. One shell brought down half the church, and another fell in the garden behind the white chateau in Vlam. where we had an A.D.S. The place was crowded with wounded at the time; it was a mercy nobody was hit, though the concussion it made smashed all the windows, and the immense hole the shell made in the muddy ground threw a shower of mud right over the whole house, roof and walls. In our divisional mess they told me the first indication of trouble was the Admiral coming into somebody's room smoking a cigarette, to discuss what all this sudden bombardment meant. The man he was visiting objected strongly to the flavour of the Admiral's cigarette, and told him he was smoking most pungent tobacco. An argument was in progress, when the Admiral's servant put his head in and said, "Beg pardon, sir, they say there's some gas floating about." This hate took a long time to die down, and we were very anxious about the white chateau dressing station. Vlam. was shelled daily now, and it was a very unsafe place for sick and wounded. We made arrangements to have huts put up further back on the Vlam.-Pop. Road. It was a strange thing that though both the above places were shelled frequently, and the road from Vlam. to Ypres was constantly shelled, once you got past the former

the road to Pop. was comparatively untouched. Later on, even the long-spared chateau at Vlam. received more attention. It got a direct hit, and one of the divisional signallers was killed.

Our Count was very nearly done in. He was standing at the top of the back steps when a shell hit the bottom step. He was suddenly enveloped in a black cloud of smoke and debris, but luckily he was untouched.

A few days later things got so uncomfortable at Vlam. that the staff decided to move back to Pop. I think it was wise, as one well-directed shell might do in the entire staff, and I suppose, in spite of the general views expressed by war book authors, that would have been an inconvenience to the division. The medical staff moved to the Fme L'Ebbe on the Crombeck Road. Not a bad spot, and out of the usual shell range. I was not at all displeased to depart from Vlam. We had been there since June, 1915, and it was now January, 1916. There does not seem much sense in any staff having a headquarters constantly under shell fire. They do not do any good staying there, and it eventually frays nerves and makes people irritable. Also it means no change out of the shell area, and a daily return from inspecting trenches, visiting brigade headquarters, etc., back to a dangerous place for a night's rest, or an attempt at one. If staff people are to be any good they must be in a state of mind to help others, be cheery, sympathetic, understanding and *placid*. No human being remains placid under long periods of nerve strain. He must have intervals of rest from constant danger or he will invariably crack up. Anyhow, we had the distinction of being twice shelled out of headquarters, once in 1914 and again in 1916.

I went down with influenza for three days. For some time I had been feeling pretty rotten. I think it is a general sort of decline in a man over 40 years of age after a year and a half of war. One's energy in the job falls off, and exposure to discomfort and shell fire tells on one. I used to get an intense headache after shelling, and if I had made an arrangement to visit certain trenches next day I began to be introspective about it and worry about it. I suppose I was getting a bit neurasthenic. Anyhow, I was very unsettled and worried. I went to Command Headquarters and asked for another job, an O.C. of a C.C.S. would suit me well. In fact, I was tired of being the only man left of the 1914 staff. I felt I was being overlooked and would be left where I was until the war ended, or I ended. I thought the administrative staff at General Headquarters should have shown a certain amount of discrimination in their appointments during a long war. What they did was to more or less draw a line behind a division and say, "You in front of this line will stay there for the duration of the war, and those behind the line will stay there also. There shall be no give and take, the war-worn veterans in the front line will stay there, and the base wallah will stay there too, so that one will be called upon to have the risks and dangers of the battle and the other will wax fat,

but worried to death, at the base." I think a change round at yearly intervals would have suited both sides, but I do not pretend to be able to judge. The difficulties were no doubt enormous.

An unpleasant incident occurred in the accusation made by the O.C. of an infantry battalion against the medical officer. He was accused of being drunk on duty. A serious charge against an officer, and an unforgivable crime in a doctor at any time. The medical officer was tried by court-martial, found guilty, and sentenced to be dismissed from the Army. In view of the controversy that has taken place twelve years after the war on the question of the truth, or not, of such presentations of the officer in war as are depicted in "Journey's End," I can say that in 1916 the drunkenness of officers was the same as in pre-war days in the Regular Army, that is, it did not exist. No commanding officer could possibly overlook excessive drinking amongst his officers, and drunkenness on duty was instantly punished by arrest and court-martial. I do not say that pre-war officers were plaster-saints; a guest-night mess dinner was a jolly affair, and if a young fellow was a bit tight once in a way nobody thought anything of it. But regular soaking was taboo, and if drinking interfered with duty the culprit was very rapidly removed from the Army. But in war time, in the trenches, an officer was on duty all the time, and I cannot see how a company commander could get away with it as Stanhope did. Fine fellow as he was, he could not go to his bed incapable night after night, as we are led to believe he did in the play. No O.C. could possibly miss the obvious fact that one of his company commanders was sodden with drink every day, and some sudden visit to the Company Headquarters by a senior officer must have given the show away. Well, there it was, in 1916 the Great War was green in the bud, and as the strain grew the nerves cracked; in 1918 things must have been much worse.

February turned very cold. On the 22nd it was snowing heavily. The enemy aircraft were getting very active and Pop. got a pretty steady series of air raids by day and night. I picked up a pretty little propeller that must have come off a small type of aerial torpedo in a night raid.

Our old mess was quite split up after we left Vlam. The Admiral was wounded on one of his trench excursions with his movable shields. The Boche got him by chucking bombs at the machine, and one burst behind it, knocking out the crew and making rather a mess of everything.

Our French Count left us for another mess. I think he went to Corps.

On March 7 I received orders to take up a different kind of medical work. So ended my connection with the division. I had been with it since August 4, 1914, and in France since September 11, 1914. The last thing I remember on the day I left was seeing the Germans shelling our observation balloon with the famous "Whistling Percy."

In 1921 I revisited Ypres and Vlamertinghe. All was changed excepting the chateau at Vlam. There it stood in the neglected and overgrown grounds, the paths all pitted with shell holes, the broken

windows shuttered up, bits knocked off corners here and there, but still intact and solid as ever. It will always be a mystery to me how the chateau escaped complete destruction. Perhaps our Belgian Baron was right. "The house of the good families must be preserved," was what he said. But in 1921 it looked as if the good family concerned had no time, and perhaps no money, and perhaps indeed no family to return to the chateau.

FINIS.

GLOSSARY.

A.D.M.S.	Assistant Director of Medical Services.
D.A.D.M.S.	Deputy Assistant Director of Medical Services.
A.A. and Q.M.G.	Assistant Adjutant and Quartermaster-General.
G.S.O.	General Staff Officer.
A.P.M.	Assistant Provost Marshal.
M.O.	Medical Officer.
G.O.C.	General Officer Commanding.
A.D.S.	Advanced Dressing Station.
C.C.S.	Casualty Clearing Station.
M.P.	Military Police.

AFTER-EFFECTS OF WAR NEUROSES.[1]

By WM. ALDREN TURNER, C.B., M.D., F.R.C.P.,

Neurologist to the War Office Medical Board.

In the short time allotted to me in this discussion a brief survey will be made of the after-effects of the war neuroses with special regard to their influence on the subsequent health and service efficiency of officers who suffered from some form of neurosis during the Great War. Attention has been called elsewhere to an increase of functional nervous disease, and more particularly of neurasthenia, in the Army in the post-war period. It is difficult to dissociate this observation from the effects of the strain of war service and the resultant weakening of the nervous and mental resistance in those who were the victims of a war psychoneurosis.

A large number of officers have come before the Medical Board who during the period 1914-18 suffered from a temporary form of functional nervous breakdown. Many have made a complete recovery and have subsequently carried on their duties with efficiency. On the other hand, there are cases in whom some degree of nervous instability has been induced by the strain of war experience, and this reduction of the nervous resistance has favoured, especially in those of a neuropathic constitution, a relapse under any special stress, such as the return to duty under the conditions of foreign service, an infective illness, a concussion or even ordinary service peace-time risks.

It is readily understood that the serving soldier is especially exposed to many conditions favouring some form of nervous exhaustion. In the British Army, in particular, those serving in India and the East, in the Soudan, and on the West Coast of Africa, are exposed to climatic conditions and to tropical infections from which those at home and in temperate climes are exempt.

From a survey of a number of cases it would appear as if those who had been prisoners of war were especially prone to some form of neurasthenic breakdown when submitted to conditions favourable to its development.

Various traumatic emergencies, such as aeroplane crashes, concussion and minor injuries of the head also favour a relapse, particularly under the climatic variations so common in tropical countries.

But these are not the only circumstances leading to relapse. Psychological experiences of an adverse kind peculiar to military life and army duties are common causes, and in a number of cases the upsetting influence is found in domestic and economic worries.

[1] A paper communicated to the Fifth International Congress of Military Medicine and Pharmacy. The Hague, June, 1931.

Thus far reference has been made mainly to the physical side of nervous breakdown, but it is now a recognized fact in clinical medicine to regard the psychoneuroses and some of the psychoses as mental reactions to situations of stress and a failure of the individual to adjust to his environment. It is only under the conditions in which repression fails to adapt the victim to his surroundings that harm results, and this is more likely to occur in those whose nervous and mental health has been lowered by fatigue, exhaustion or illness.

The occurrence of a psychoneurotic reaction is no mere haphazard circumstance. It occurs on those occasions when a new adjustment (of outlook) is required. It is the individual's response to some new and unusual happening or to a difficult situation in which he finds himself. Abundant illustrations of this were provided during the war, and most of us can recall from our personal experience instances of this both in civil and military life.

Although the psychogenic element is far reaching and all important in the causation of the anxiety states, hysteria, and some of the confusional and paranoid psychoses, the contributory influence of physical causes should not be overlooked.

Fatigue, overwork, debilitating illness or fever, and above all insufficient or disturbed sleep, prepare the ground. Thus loss of body weight ensues, and the patient eventually is unable to withstand the encroachments of morbid ideas and loss of self-confidence with its feelings of incompetency and unworthiness.

The most common post-war neuroses observed amongst officers are :—

First, *neurasthenia,* using this term in its more acceptable sense of a temporary mental and physical reduction or depression associated with debility and exhaustion. In its simplest form the patient is incapacitated from duty by reason of fatigue, mental and physical asthenia, failure of concentration, mental distress and depression, coloured by various preoccupations and morbid ideas. It is observed chiefly in those subject to chronic auto-toxic infections, in convalescence from influenza or other acute illness, after those tropical infections to which serving soldiers are exposed and not uncommonly to long and continuous service in the East. The causes are in consequence mainly of a physical kind, the sufferers usually men of more mature years, the course of the disability often prolonged, and the outlook on the whole favourable to recovery in the absence of any definite organic disease.

Secondly, *emotional or anxiety neurosis.* This was a common form of neurosis in officers during the war, and is probably the most frequent of the post-war neuroses observed both in civil and military practice. The prominent mental symptom is depression coloured by underlying fears and dreads. The depression is not continuous, nor is it of the negative type characteristic of the melancholic. There may be periods when the patient is relatively free of anxiety, but such spells of intermission may be broken

by apparently causeless waves of depression, accompanied by anxiety and apprehension. Other outstanding symptoms are dreams or nightmares, loss of self-confidence, asocial feelings, disturbed sleep and sometimes inclinations of a suicidal kind.

The clinical picture, which is that of increased emotionalism, may arise from any emotional experience of an unpleasant, terrifying or upsetting kind—domestic, financial or in connection with military duty. Its onset is favoured by a preceding attack, by fatigue, exhaustion, stress of climatic conditions and insomnia. Officers who suffered from this neurosis under war conditions have been found to be prone to relapse when the circumstances already mentioned have occurred in the course of further service. This is a very persistent disability, and in its more severe form may last for several years. It may be contended that there is no definite dividing line between these two forms of nervous illness. To some extent this is true, as exhaustion and mental depression are features of both and anxiety may add a special colouring to nervous asthenia. But pure neurasthenia has a more definitely physical basis, while the origin of the anxiety group is based primarily on psychogenic causes.

Thirdly, *cases with an organic basis*. At all times there may be a difficulty in the differential diagnosis of the concussion from the emotional cases, and this difficulty becomes more pronounced the later the patient is seen after the trauma.

The cases to which reference is made are the cerebral concussion group, where some degree of "commotion" of the cranial contents has occurred and the closely-allied group of minor gunshot wounds of the head, mainly scalp wounds, in which radiological evidence is negative regarding fracture of the skull. The symptoms of the latter group are quite definite, the most pronounced being headache of a severe, persistent and periodic type, invariably aggravated by fatigue or mental effort. During the period of persistence of the headache, which may last for a day or two, the patient may be incapacitated.

Amongst other distressing symptoms are giddiness, insomnia, disagreeable head sensations, defective power of mental concentration and application, and impaired memory. In a small number of patients there may be observed alterations in character and disposition and occasionally mental failure.

This group differs essentially from the purely psychogenic cases by the presence of an organic lesion involving the cerebral tissues ; this is usually a laceration, a contusion or a localized œdema. Trotter and other writers have shown that in consequence of the impingement of a glancing bullet or piece of metal, a cerebro-cortical injury may occur without fracture of the skull vault or any clinical evidence of localized cerebral damage. The bone, indeed, may recover its shape completely and may have sustained no fracture and yet have caused a definite local injury of the subjacent brain.

It is now recognized that comparatively trivial injuries of the head, classified merely as scalp wounds, may be the cause of persistent and distressing nervous disabilities.

The more severe cases are often quite incapacitated for a long time, but the slighter cases usually recover sufficiently to be fit for further military duty. From the service standpoint this class is important, as a relapse not infrequently follows a return to active service, more especially in India, the East and tropical countries.

It is unlikely that concussion or cerebral contusion, unaccompanied by any emotional element, gives rise to psychoneurotic symptoms. But the wound may have been received by the man when in a state of anxiety, and may have been just sufficient to precipitate the more acute features of the neurosis.

The mere infliction of a wound of the head may be a terrifying experience, so that in the early stages of many cases of minor gunshot wounds of the head, anxiety symptoms are present. In the later stages, other circumstances, such as a fear of non-recovery or of resulting mental incapacity, give a special colouring to the original symptoms of the cerebral lesion. In this way arise apprehensions and fears which often assume the importance of obsessions.

Moreover, it is always a difficult matter to determine just the point where the neurosis merges into a partially conscious exaggeration of symptoms. So many influences combine to favour exaggeration or prolongation of symptoms, such as the return to further service, permanent incapacity, and considerations over pensions, that there is no question in the whole range of psychoneurotic disorders upon which medical officers have greater difficulty in giving a decision.

Fourthly, *epileptic reactions.*—Although not included strictly among the psychoneuroses, a few words may be said upon the subject of epilepsy, as it is met in post-war circumstances.

The first form is "traumatic epilepsy," arising from direct injury to the cerebrum in consequence of a penetrating wound of the skull, with local injury to the brain or from the presence of pieces of metal within the cranial cavity.

This type of epilepsy presents one feature of much importance, viz., a latent period of from a few months to several years between the infliction of the wound and the onset of the seizures.

There is a second type of case in which a superficial and apparently trivial head or scalp wound may be followed by fits of a generalized epileptic type. In these cases radiological examination of the skull is negative, but there is reason to suppose that the wound has occasioned a local cerebro-cortical laceration or contusion.

The third type of case is that observed occasionally in young officers who are returned home from foreign service certified as suffering from "fits," alleged to be of epileptic character. These are stated to have

originated under special circumstances of mental strain, worry or overwork. Such seizures may cease when the officer comes home, and the question arises whether the cases do not belong to a special group of epilepsy of psychogenic origin.

My experience in this matter is in favour of the view that psychical or emotional causes may give rise to seizures differing in no respect from those of the so-called "essential epilepsy." In some persons a fit is so definitely a reaction to a difficult situation, that its occurrence, as it were, "clears the air." In civil practice the existence of such a group cannot be disregarded, for it is recognized that certain persons may exhibit seizures, clinically indistinguishable from epilepsy, as reactions to situations of a purely psychical nature.

Clinical and other Notes.

CASES OF PYOSIS MANSONI.

By Captain C. E. ECCLES,
Royal Army Medical Corps,
AND
Assistant Surgeon R. DORLING,
Indian Medical Department.

This skin disease is fairly common in Southern India and Ceylon during the hot seasons, and appears to be most prevalent during the monsoon

Fig. 1.—Showing the "vesicular stage."

period. The undermentioned cases occurred in Multan, which has practically no monsoon and an atmosphere which is mainly very dry.

These cases are of further interest from a clinical point of view as they

closely resemble mild chicken-pox, and the bite of the "Dam-din fly." The situation of the rash, however, in most cases is sufficient to distinguish between them.

The disease is contagious. The cases infected were occupying the same barrack room, and were sleeping fairly close to each other.

The five men infected reported sick, complaining of a rash which on examination appeared to resemble closely that of chicken-pox. The rash was situated in most of the cases on the flexor aspect of the forearms, on the neck, thighs and axillæ, and appeared to be divided into three distinct stages, appearing in successive crops.

FIG. 2.—Showing the vesicles and pustules appearing in crops on the neck and axilla.

(1) *The Vesicular Stage.*—The vesicles $\frac{1}{10}$ inch in diameter, with an area of inflammation around the circumference, were slightly raised above the surrounding skin.

(2) *The Pustular Stage.*—The pustules were about the size of a small pea. This stage of the infection appeared to cause the patients most discomfort, being associated with rather intense itching.

(3) *The Impetigenous Stage.*—In which the pustules broke down and became covered with a yellowish crust. Slight pitting followed at this

stage, and the diseased areas cleared up, leaving a purplish discoloration of the skin, which lasted for a short period.

Smears were taken at the different stages, and microscopic examination showed in the vesicular and pustular stages, small Gram-positive diplococci scattered about the field of the microscope; but in the impetiginous stage, practically no diplococci.

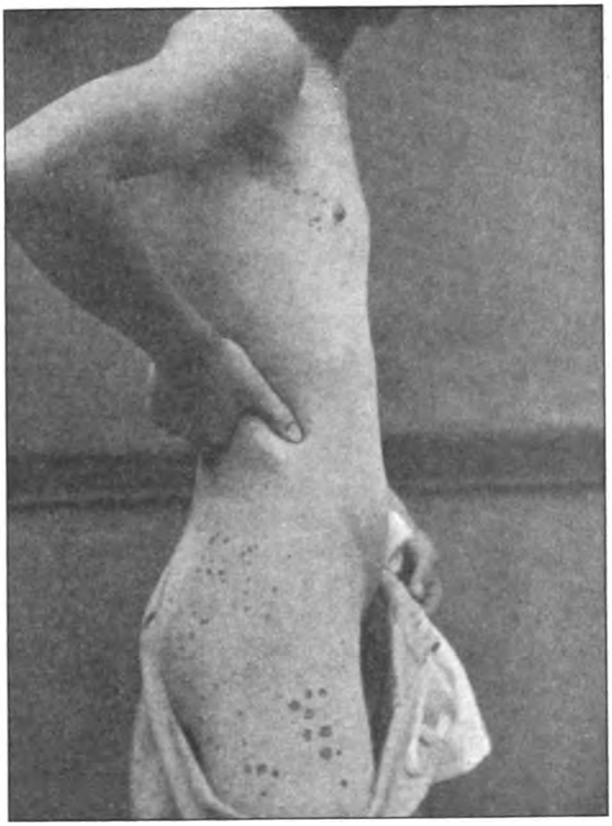


FIG. 3.—Showing the "impetiginous stage."

Treatment.—Different treatments were adopted in each case. The following drugs were used: (1) Acid. picric. ten per cent aqueous solution; (2) lotio hydrargyri perchloridi $\frac{1}{2000}$; (3) unguentum hydrargyri ammoniati dil.

The best results were obtained by the use of the unguentum hydrargyri ammoniati dil., the cases clearing up within six to seven days and leaving the purple discoloration which has already been mentioned.

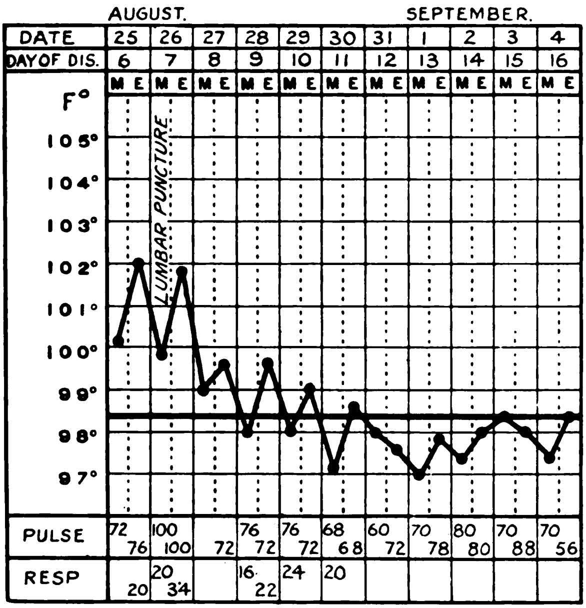
APPARENT RECOVERY FROM AN ATTACK OF ACUTE TUBERCULAR MENINGITIS.

By Major W. Walker, M.C.,
Royal Army Medical Corps.

and

Captain F. J. O'Meara.
Royal Army Medical Corps.

A recruit was found medically fit at the Central Recruiting Depot, Whitehall, London, on August 13, 1931. He weighed 112 pounds and bore marks of successful vaccination, in childhood, on his left arm. He had been employed as a waiter at an hotel in London. His father stated, subsequently, that for two months before enlisting his son had been irritable and had changed in his manner. He was posted to the Depot at Richmond in Yorkshire. He was found fit on re-examination and vaccinated by two linear insertions on the right arm, on August 18,



1931. On the 20th he complained of constipation. On the 24th he was admitted to the Military Hospital, Catterick, and was then constipated and complained of occipital headache. On the 25th his temperature was 100·2° F., his pulse-rate 76 a minute, respirations 20 a minute. He complained of occipital headache and nuchal pain and lay in bed on his left side with his head drawn back. He had been vomiting after feeds. He had two clean linear vaccination vesicles on his right arm. There was little inflammation of the surrounding skin.

On physical examination tache cerebrale was found to be present.

Pupils were equal and reacted to light, tongue furred, neck held stiff in a slightly retracted position. Apex beat of the heart was within the nipple line, heart sounds were loud but free from murmurs. Nothing abnormal was detected in the lungs. Abdominal reflexes were present. There was well-marked capillary pulsation in the skin. No enlargement of organs was detected. Knee-jerks absent, ankle-jerks present, extensor plantar reflex response flexor, no ankle clonus, Kernig's sign doubtful on both sides.

The following treatment was ordered: Calomel 3 grains to be followed by a saline purge in four hours. Sodium bromide 20 grains, chloral hydrate 15 grains six-hourly, morphinæ tartrate ¼ grain at 10 p.m.

On August 26, his temperature was 99·8° F., pulse-rate 100 a minute, respirations 20 a minute. He lay on his side with his head retracted; Kernig's sign was still doubtful.

Blood examination: Total white blood-cell count, 10,200 per cubic millimetre. Differential white blood-cell count: Neutrophil polymorphs, 78 per cent; lymphocytes, 18 per cent; large mononuclears, 4 per cent.

On lumbar puncture the cerebro-spinal fluid was found to be turbid and under pressure; 35 c.c. escaped in a steady stream and were replaced by 25 c.c. of anti-meningococcal serum. The cerebro-spinal fluid gave a cell-count of 175 cells per cubic millimetre, over 95 per cent being lymphocytes. Tubercle bacilli were seen in smears made from the centrifuged deposit of the cerebro-spinal fluid, stained by the Ziehl Neelsen method. On the 27th he was more comfortable, his headache was less severe, his temperature was 99° F., and his pulse-rate 72 per minute. The same treatment was continued. On September 1 his temperature and pulse-rate were normal and he was given a light diet. He was quite free from headache and vomiting had stopped. He was still constipated and required a soap enema to help him to evacuate his bowels. On the 8th he became rather hysterical; he was surrounded by four very ill patients, three of them in delirium. He required bromides and morphia for two days, by which time he had regained his self-control. On the 20th his nervous system was free from abnormal clinical signs, but his knee-jerks were still absent. Ophthalmoscopic examination of his fundi did not reveal any obvious abnormality. He was allowed up for one hour. On the 29th he weighed 110 pounds. A radiogram of his chest showed prominent lung markings, but no radiological evidence of lung infiltration.

On October 8 he was convalescent, he weighed 115 pounds, his knee-jerks had returned, and he could touch his toes with his fingers, holding his knees braced back, without discomfort. He walked well. He appeared before a medical board and his discharge from the Army was recommended.

The case has been considered worthy of record for the following reasons:—

(1) Apparent complete recovery from an attack of acute tubercular meningitis.

(2) The onset of an illness involving the central nervous system after vaccination—a coincidence.

(3) The case occurred in the course of several sporadic cases of cerebro-spinal meningitis. It differed from them on clinical grounds in the fact that the abdominal reflexes persisted throughout the illness and that capillary pulsation in the skin was very well marked. These signs would not have been sufficient to establish a diagnosis without bacteriological examination of the cerebro-spinal fluid.

An endeavour will be made to keep in touch with the patient for two years.

Our thanks are due to Lieutenant-Colonel M. F. Grant, Royal Army Medical Corps, Commanding Military Hospital, Catterick, for his permission to publish the notes on this case.

AN OPERATION FOR THE CURE OF "SNAPPING ANKLE."

By F. W. MARSHALL, M.D., B.S.,
Military Hospital, Lichfield.

THE condition which for want of a better name is referred to as "snapping ankle," is of considerable rarity, and as its successful treatment is apt to present some difficulty the following case is thought worthy of being placed on record.

Patient: Private W. H., aged 26, service six years.

Previous History.—The patient stated that on September 10, 1929, he injured his left ankle while playing basket ball. He stated that he jumped for the ball at the same time as another player, and the latter, who was wearing heavy ammunition boots, landed on the outer side of his left ankle. He was admitted to hospital, and remained there for four days, the diagnosis being "contusion of left foot." His medical history sheet states: "Swelling on outer side of left foot; some discoloration. Pain chiefly on plantar aspect of fourth metatarsal bone. Lead lotion and rest in bed. Recovered." The man stated that a fortnight after his discharge from hospital he noticed a "snapping" on the outer side of his left ankle on moving it. This has continued ever since, and while his ankle has felt weak, especially first thing in the morning, it has never completely incapacitated him, and he has not found it necessary to report sick with it until the present time.

Condition on Admission.—The patient was able to produce a loud snapping noise by quickly dorsiflexing his left ankle. On examination, it was found that the tendons of the peronæus longus and peronæus brevis became displaced forwards on to the lateral surface of the external malleolus on dorsiflexion of the foot. The displacement was accompanied by a moderately loud snapping noise On extension of the foot, the tendons slipped back to lie in their normal position in the groove on the posterior border of the lower extremity of the fibula.

The disability produced by the condition was not severe, but the man felt that his ankle was weak, and he was becoming afraid to indulge in very active exercise. He was willing, and indeed anxious, for operative measures to be undertaken for the cure of the condition.

The Operation.—This was performed on April 20, 1931, under general anæsthesia. The procedure adopted was as follows:—

The leg was exsanguinated, and a tourniquet applied above the knee. A curved incision, having its concavity forwards, was made over the peronæal tendons, the centre of the incision being just above the tip of the external malleolus. It was found that the superior peronæal retinaculum had been torn and was practically absent. The lateral surface of the lower end of the fibula was covered with fibro-cartilage, and on this the peronæal tendons were lying. With a blunt hook, the tendons were easily hooked back to lie in their groove on the posterior border of the malleolus.

A vertical incision was now made on the lateral aspect of the right thigh, and two pieces of fascia lata, about one and a half inches long and a quarter of an inch broad, were removed.

These fascial grafts were now sutured over the peronæal tendons, lying in their corrected position. The grafts were sutured with No. 2 chromic catgut to the periosteum covering the lateral surface of the fibula anteriorly, and to the periosteum covering the lateral surface of the calcaneus posteriorly, thus bridging over the tendons and forming a new retinaculum. The superficial fascia was then united with a running suture of fine catgut and the skin sutured with silkworm gut sutures. The wound in the right thigh was closed in the usual manner.

After-treatment.—The skin sutures were removed on the tenth day after operation, when both wounds were healed. The patient was kept in bed, however, for three weeks, gentle passive movements being instituted at the end of fourteen days. On getting up, the ankle was found to be very stiff and rather painful on walking. The tendons, however, remained in their proper position. Daily massage and movements were given for a further period of three weeks, when the ankle was quite free from pain and its movements were normal. The patient walked well and stated that his ankle felt quite sound.

Re-examination was carried out after three months, during which time ordinary duties had been performed and the soldier had been to camp. The ankle was thoroughly sound, and no disability whatever was complained of. The peronæal tendons had maintained their corrected position.

Discussion.

The cause of the condition in the case reported was a complete rupture of the superior peronæal retinaculum, thus liberating the peronæal tendons from their groove and allowing them to become displaced forwards on dorsiflexion of the ankle-joint. The cause of the rupture was probably

forcible inversion of the ankle-joint. The condition appears to be one of some rarity, and I have been unable to find any reference to it in the literature at my disposal. As the treatment by reconstituting the superior retinaculum by a fascial graft has been so successful, it is put forward as the method of choice for curing the condition, particularly where it is of long standing. In very recent cases, it is possible that immobilization in a corrected position in plaster might effect a cure, but of the efficacy of this I have no experience.

Echoes of the Past.

THE ARMY MEDICAL SERVICES, 1857-69.

By Lieutenant-Colonel G. A. KEMPTHORNE, D.S.O. (R.P.).

One of the few immediate results following the agitation for Army Reform after the Russian War was a real effort to improve the lot of the sick soldier. One other important measure was taken, however, in the transfer of the Ordnance, Commissariat, and Purveyor-General's Departments from civil to military control. The Purveyor-General's Department, which dealt with all hospital supplies, was not merged into the Commissariat and Transport Corps until 1870, the year when that corps was constituted.

On August 1, 1857, a Royal Warrant replaced the Medical Staff Corps, formed during the war to staff both general and regimental hospitals, by the Army Hospital Corps, a military cadre with combatant titles, which members of the old corps and soldiers of good character from the combatant units were encouraged to join. Though the distribution of the personnel rested with the Director-General, A.M.D., it was not under the executive command of the officers of the department, but of Captains and Lieutenants of Orderlies appointed from the combatant ranks. To further complicate matters, a Warrant of September 27, 1861, divided the corps into a medical section comprising the ward orderlies and dispensers, and a purveyor's section which included stewards, cooks, storemen and general duty orderlies. The purveyor's section was at the disposal of the Purveyor-General. This Warrant also limited the employment of men of the corps to general, depot, or field hospitals; regimental hospitals were to be staffed by regimental orderlies. The A.H.C. did not serve in India, though they took part in the China and Abyssinian campaigns conducted by the Indian Government.

The warrant of 1857 expressly provided that men enlisting in the A.H.C. were liable for service in the field as well as in hospitals; but it was obvious from the first that they were too few in numbers to provide stretcher-bearers in war. At the same time the imperfections of the Transport

Service, even after the formation of the Military Train, precluded the preparation of any organized scheme for the removal of wounded from the field. This question could not be indefinitely shelved. The mortality among the French and Austrian wounded following the battles of Montebello, Magenta, and Solferino, and in the opening battles of the American Civil War made a powerful impression on the world. The Geneva Convention of 1864 and the formation of Red Cross Societies by all the great powers kept the matter alive. Surgeon-General Thomas Longmore put the case strongly in his comprehensive "Manual of Ambulance Transport," first published in 1869. It was some years before bearer companies with their own ambulance vehicles appeared in war establishments, but a feature of the overseas expeditions it is now proposed to follow was the provision of well-found hospital ships combining the functions of both sick transports and base hospitals.

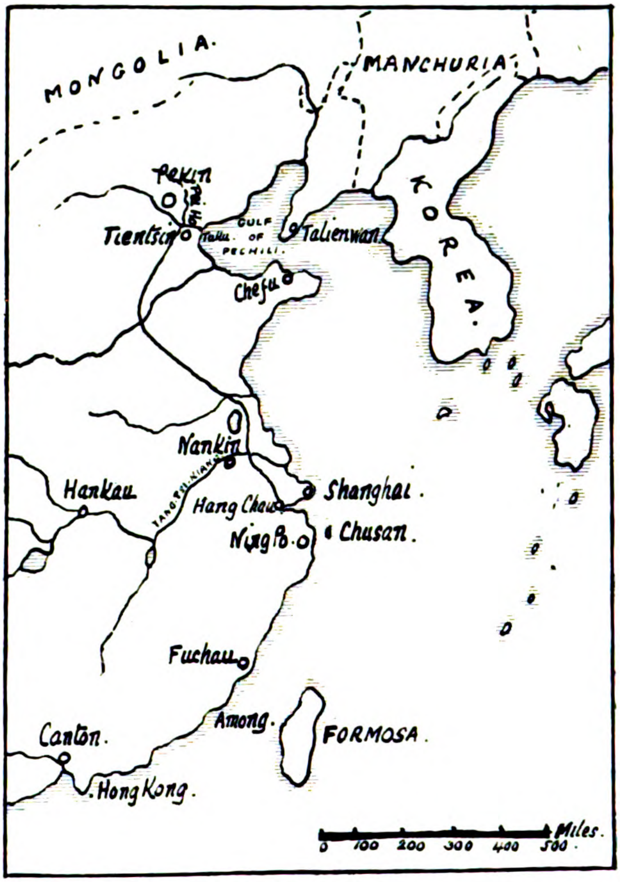
Up to the time of his death in 1861, Lord Herbert of Lea laboured unceasingly on the improvement of barracks and hospitals. The work commenced by his Barrack and Hospital Commission has been steadily continued up to the present day. In 1860 the Army Medical School was opened at Fort Pitt, Chatham. An entrance examination for officers of the Medical Services had been started, and there was a reasonably good competition for vacancies. Edmund Parkes, who became Professor of Hygiene, and Sir Thomas Longmore, the Professor of Surgery, were men of European distinction, and the school acquired a high reputation. The Herbert Hospital at Woolwich and the Victoria Hospital at Netley were now nearing completion, and the latter became the home of the Medical School in 1863. The first volume of the series of Annual Reports on the Health of the Army had been published in 1859.

Dr. Andrew Smith, who had piloted the Medical Services through the stormy period of the war, retired in 1858. He had frequently tried the patience of Miss Nightingale, whose fiery zeal inevitably brought her into conflict with official methods. But he was no blind obstructionist. Many proposals emanating from civilian sources needed digestion before they could be absorbed into the military system, and the Director's shrewd common sense and cautious disposition were no doubt assets in reducing things to a proper proportion. He received a K.C.B. in 1859. Thomas Alexander, the able and popular P.M.O. of the Light Division, who succeeded, was a man after Miss Nightingale's own heart, but he lived only a few months. Sir James Brown Gibson, the Duke of Cambridge's personal physician in the Crimea, held the office from 1860 to 1867, when Sir Thomas Galbraith Logan become Director-General.

The Second and Third China Wars.

The failure of China to carry out her treaty obligations brought on the Second China War of 1857. The troops despatched included a detachment of the Medical Staff Corps and twenty-seven medical staff officers under

Deputy-Inspector-General Dane. Operations were delayed by the outbreak of the Indian Mutiny; but in December Canton was stormed by a combined French and British force and the Taku Forts were taken. The treaty which followed being still unratified the following year, a British naval squadron attempted to enter the mouth of the Pei-ho River from which it was repulsed with heavy loss. The result was the Third China War.



China.

In March, 1860, a force of British and Indian troops assembled at Hong Kong under Sir Hope Grant, provision for which was made on a very ample scale. The P.M.O. was Inspector-General William Mure Muir with Deputy-Inspector Samuel Currie as Field Inspector, and Staff Surgeon William Rutherford as Sanitary Officer,[1] a new appointment which the

[1] The adoption of the title from the Continent was unfortunate. In the lay mind, including that of the average combatant officer of the British Service, sanitation (the art of disease prevention) already implied no more than conservancy.

Crimean War had brought into being. Forty medical officers were sent out from England and a large contingent of the Army Hospital Corps. Two hospital ships, the "Mauritius" and the "Melbourne," were equipped at home with operating rooms and all the latest appliances to take 200 patients each, a sailing ship, the "Lancashire Witch," and another steamer, the "Sir William Peel," were fitted up at Hong Kong, and four others were allotted for native troops and coolies. Over 1,000 hospital beds were provided at Hong Kong and a convalescent depot was prepared at the Cape of Good Hope.

The camp at Kowloon was carefully organized. Food was good, and "a respectable house in Victoria" furnished wholesome liquor for the canteens. In spite of this, there was a certain amount of traffic in *samshoo*, a native rice spirit, which also caused trouble later. Rations were fresh meat, 1¼ pounds; biscuit, 1 pound; rum, ½ gill, and usually fresh vegetables, which were plentiful throughout. A notable innovation was the establishment of a cadre of sanitary police, who seem also to have dealt with refuse disposal. Land transport consisted largely of coolies with a menagerie of every kind of animal, and was not a success. A battalion of the Military Train was present, but, having fought as dragoons in the Mutiny, the new corps did not take kindly to transport organization, which was consequently casual. The ambulance vehicles employed were officially described as doolies, stretchers, cacolets, litières, carts and wheelbarrows, but fortunately during the military operations water transport was nearly always available. The Indian doolies were found too heavy for the Chinese bearers; so suitable ones weighing 58 pounds were made locally. Stretchers were provided with awnings and fitted with slings and poles to suit the native mode of carriage. Mule cacolets, so much favoured in the Crimea, continued to be despatched with military expeditions for many years to come, but were rarely used, either because no mules were available, as in New Zealand, or because the available mules, as in India, were too small to support the burden of two men. The wheelbarrow sent to China was a clumsy two-wheeled push cart, the predecessor of the wheeled stretcher.[1]

On April 21 the island of Chusan, the scene of the disastrous sanitary scandal of 1841, was occupied by a mixed brigade. Part of the troops occupied public buildings in the town of Tsing Hai, while the remainder stayed on board ship. Orders as to disease prevention were issued. Water was to be filtered through charcoal, or boiled, and clarified with alum. An empty transport served as a general hospital. The health of the brigade was excellent.

At the end of June the British force, comprising about 14,000 men, was

[1] This type of vehicle was successfully employed by Baron Larrey after the battle of Bautzen, 1813, when the hand carts commonly used in South Germany were improvised for the removal of the wounded (Longmore).

landed at Talienwan in the Gulf of Pechili, and half that number of French at Chifu. A base camp was established, divisional general hospitals were formed, and further sick accommodation provided for convalescents at Odin Bay and on a transport which lay off the shore. Lieutenant Allgood, the D.A.Q.M.G. of the First Division, writing home to his mother, referred to "the heaps of medical people of no earthly use in camp," resenting especially the powers recently conferred on the sanitary officer to meddle in what he considered his own preserves. He evidently shared the views of another distinguished staff officer, Lieutenant-Colonel Garnet Joseph Wolseley, as to the doctor's status in the military world.

The French, who proved embarrassing allies, were not ready; but on August 1 the combined force arrived off the Pei-tang-ho and disembarked in the mud. The town was occupied, and on the 12th 100 sick were transferred to the hospital ships and the Army marched. Next day they were within two miles of the Taku Forts. On August 21 one of these, which was the key to the whole position, was carried by assault, and the Chinese general surrendered. Our casualties were 101, those of the French 158. The operations took place over low-lying swampy ground intersected by broad deep dykes up which the tide ran. After rain, the mud rendered the passage of wheeled traffic impossible. A dressing station, described by the *Times* correspondent as a comfortable hospital, was established in the village of Tungkoo close to the river and two and a half miles from the objective. From this the hospital ships were reached by boats in thirty-six hours. The credit for the success of the scheme of evacuation was largely due to the zeal and intrepidity of the Chinese coolies, six of whom were wounded in carrying back casualties to the dressing station.

During the succeeding twenty-four hours heavy rain fell. There was some access of sickness and a few cases of cholera. During the next eight days 200 patients were transferred to the hospital ships, diarrhœa and dysentery being the prevailing diseases, but the number of sick never exceeded five per cent during the campaign.

Tientsin was occupied on September 5, where the Army remained pending negotiations with the court at Pekin. During the march our men bivouacked, and the French used their *tentes d'abri*. The order of dress was cloth trousers, summer tunics and wicker helmets with pugris; packs were not carried. From Tientsin there was a regular service of gunboats between the general hospital established in a joss-house and the ships at the mouth of the Pei-ho. The weather got suddenly colder, and double-fly Indian tents were issued. There were several deaths from dysentery; one-third of the deaths were due to liver abscess. The surgeons ascribed the disease to extremes of heat and cold, the abuse of *samshoo*, fruit, and bad water. It does not appear that water purification was attempted on the march. At Pei-tang-ho forty tons of condensed water was supplied daily to the Army from the ships in the river.

The negotiations failed. Mr. Parkes, the political officer, was treacherously seized, maltreated and imprisoned, and some of his escort murdered. The Army accordingly advanced the seventy miles to Pekin, which was occupied on October 13. Small engagements were fought on September 18 and 21, in which fifty casualties occurred.

The French secured a vast quantity of loot from the summer palace. Some British officers and others gleaned what was left, which was thrown into a common fund and auctioned for the general benefit of the men.

The force returned to Tientsin in the middle of November. A small garrison was left, and the remainder dispersed. The infantry had a race to reach their embarkation point before the river became ice-bound. The cavalry, who had to march thirty miles further, met with severe weather. The grass cutters of the Indian regiments had twenty cases of frost-bite. Seven died with gangrene of both feet, others recovered with loss of their extremities.

The preparations made for the care of the soldiers' health in the Third China War were much in advance of those of any previous campaign, and the Inspector-General was deservedly congratulated on the low constantly-sick rate of 59·5 per 1,000.[1] The climate was good, no special hardships were encountered, and water transport facilitated evacuation of sick and wounded. The battle casualties admitted to hospital numbered no more than 146, of whom 34 died. Dr. Muir, in his report to the Director-General, laid stress on the value of the hospital ships, hinted that co-operation with the Royal Navy over transport questions was not always satisfactory, and suggested that Departments should be allowed a proportion of transport of their own. It is of interest to note that he favoured a system of General Hospitals for active service, though he recognized that a combined system of Regimental and General Hospitals was necessary under the existing organization. As Director-General (1874-1888) he was able to put his ideas into practice.

After the fall of Pekin a small force was sent under General Staveley to Shanghai, where the activities of the Tae Pings, long in revolt against the Central Government, was causing anxiety to the European Colony. A cosmopolitan Defence Force had already been raised, which, under the leadership of Major Charles Gordon, R.E., and a handful of British officers, developed into the so-called "Ever Victorious Army." Gordon's P.M.O. throughout was a British Service officer, Surgeon A. Moffitt. Among the early recruits was Assistant Surgeon Samuel Halliday Macartney, late of the 99th Foot. He was selected by Gordon as his own successor in command, but his ambition was to join the Chinese Service. Here he rose to great distinction, became a general, and married a Chinese lady. He was later

[1] The hospital admission rate for North and South China combined during 1860 was 2,049 per 1,000, the death-rate 48·28. At Hong Kong and Canton there were fifty-two deaths in August.

Secretary to the Chinese Embassy in London, where his tactful mediation in the affairs of his own and his adopted country was recognized in 1886 by the K.C.M.G.

The following senior officers have been identified as serving in the Third China War, *Deputy Inspector-Generals* William Mure Muir and Samuel Currie; *Staff Surgeon-Majors* W. Rutherford (99th), H. J. Schooles (S.M.O. Calvary Division), J. Burke (Buffs); *Staff Surgeons* R. Lewins, Brinsley Nicholson, D. F. Rennie (31st). The following were in medical charge of regiments: *Surgeons* James Mee (44th), J. Lamprey (67th), R. C. Todd (99th); *Assistant Surgeons* J. H. Finnemore (R.A.), E. L. M'Sheehy (K.D.G.), C. W. Woodroffe (Royals), H. J. Rose (Queen's), Graham Young (60th).

Canada, 1862.

As a result of the dispute with the United States over the Trent Affair, the troops in Canada were augmented in the winter of 1861-62 from about 3,000 to 10,760. War was averted, but the mobilization involved much anxious thought on the part of Departments concerned with transportation, supply and medical arrangements. As the St. Lawrence river was frozen the majority of the troops were landed in Nova Scotia and conveyed in sledges holding eight each to Rivière de Loup, whence there was a railway to Montreal. There were ten halting places in the 306 miles, at which the P.M.O., Deputy-Inspector-General J. D. McIlree, placed hospitals and medical officers. Between January 6 and March 10, 6,818 men were moved. Jack boots, seal-skin caps, comforters, jerseys, and woollen drawers were issued, and mocassins and buffalo robes were provided *en route*. There were four deaths, two being from alcoholism, and no more than seventy admissions to hospital. Inspector-General W. M. Muir, C.B., late P.M.O. China Expeditionary Force, was sent out as P.M.O. North America with a number of medical staff officers and a detachment of the Army Hospital Corps. The strength of the Corps in Canada four years later was still as high as forty-three.

The Ambela Campaign, 1863.

The Indian Frontier Medal on its institution in 1869 was awarded to the survivors of no less than fifteen small wars between 1849 and 1863. Some of these were carried out entirely with Indian troops, but there was usually a stiffening of Europeans. The expedition into the Yusafzai country known as the Ambela Campaign, under Sir Nevile Chamberlain, was despatched to deal with a gang of Hindustani fanatics who had established themselves at Malka, on the northern side of the Mahaban mountain, in the vicinity of the Indus valley. The country as a whole was reported friendly, and no great opposition was anticipated. On October 20 a column about 6,000 strong, including the 71st (H.L.I.) and the 101st Royal Bengal Fusiliers, entered the Ambela Pass along a difficult and narrow track with the very inefficient transport spread out in single

file miles behind. At this juncture all the tribesmen rose, and the General found himself at the head of the pass, unwilling to retire, and partly owing to the strong opposition, and partly owing to the difficulty of guarding his communications, unable to advance. There were 425 sick and wounded, whose carriage and protection formed an important part of the problem. For three weeks, therefore, the force remained entrenched in the face of an enemy who made daily attacks. Three times the Crag Picket, the key to our position, was taken and had to be recaptured. Here Assistant Surgeon W. Pile, of the 101st, and the subaltern in command were killed in a gallant attempt to rally their men. The General himself was wounded by a sword cut in leading a counter-attack, and when General Garvock arrived with reinforcements, among them the 7th Fusiliers and the 93rd, he succeeded to the command. The strength had now risen to something like 9,000, and on December 15 the enemy was driven from a strong position at a cost to ourselves of 172 casualties. The tribesmen soon after submitted, and the object of the expedition, the destruction of Malka, was accomplished. The casualties in this little war, apart from losses due to sickness, were 238 (including 15 British officers) killed and 670 wounded. A sick depot had been established at Nawa Kala, two marches in rear of the British position, to which at least one sick convoy was despatched under a very strong escort.

The transport during the Ambela Campaign, which was scraped together with some difficulty at Peshawar, seems to have consisted mainly of mules. Patients unable to ride had to be carried in doolies. Experiments made in Hazara the following year conclusively proved that litters and cacolets were not suitable to the average Indian mule. Camel kujawahs, though employed successfully in the First Afghan War, found no favour on the frontier until the breakdown of the bearers in the war of 1879 caused their reintroduction for both sitting and lying sick. The last Waziristan campaign showed their value under capable, though necessarily constant, supervision.

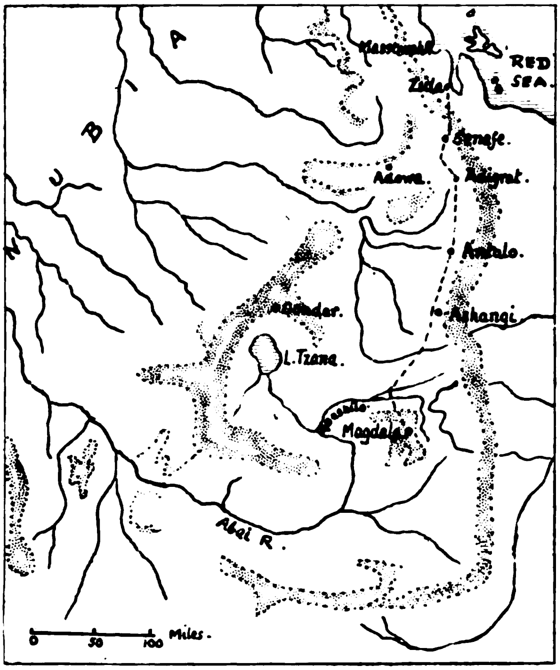
The General stated in his despatch: "Surgeon W. Simpson, M.D., 71st Highland Light Infantry, and Surgeon W. Munro, M.D., 93rd,[1] on different occasions senior medical officers with the British portion of the force, Surgeon H. B. Buckle, 1st Punjab Infantry, the senior medical officer with native troops, and the medical officers of the force generally, performed their duty ably and successfully under difficult circumstances." Dr. Cheke, 23rd Pioneers, and Assistant Surgeon Sylvester, of the 11th B.C., were also mentioned. Besides the above there were present Surgeon J. Hendley and Assistant Surgeon W. Sly of the 7th, Assistant Surgeons C. P. Baxter and B. J. Jazdowski of the 93rd, J. B. Hanna and S. Archer of the 101st, C. Ricketts, R.A., and G. Auchinleck, besides Indian army officers. The

[1] Surgeon General W. Munro, C.B. He published a book entitled "Reminiscences of Military Service with the 93rd Sutherland Highlanders."

Highland Light Infantry memorial of their dead comrades in this almost forgotten campaign is one of the most interesting and attractive in Glasgow Cathedral.

THE ABYSSINIAN EXPEDITION, 1867-8.

The Abyssinian expedition of 1867 was the result of the misbehaviour of King Theodore, the titular descendant of Solomon's ally the Queen of Sheba, who having degenerated into a drunken debauchee, not only cruelly oppressed his own subjects, but, having found some cause of complaint against Great Britain, imprisoned our Consul and other Europeans in his country.



Abyssinia.

Abyssinia proper consists of a high mountainous tableland between which and the Red Sea there is a tract of arid low-lying waterless country. At Massowah this is only a few miles wide, but at Tajurrah it widens out to between two and three hundred miles. The highlands are well watered, the lowlands waterless and uncultivated. The former were reported healthy, though from March to November malaria was prevalent in the valleys. The rainy season was May to September.

Malkatta in Annesley Bay, 30 miles south of Massowah, was chosen as the point of disembarkation. The expedition involved the crossing of the plain, the ascent of the plateau through 50 miles of passes, followed

by an advance over more than 350 miles of rugged mountain and valley to Magdala, Theodore's stronghold, situated at a height of 10,000 feet. The commander of the expeditionary force, which was drawn from India, was Sir Robert Napier. A total of 62,220 men were engaged, of whom 13,164 were combatants. Of these 2,674 were British, and 10,490 Indians, mainly of the Bombay Army. Eight men-of-war accompanied the transports, and a Naval Brigade took part in the operations. Three fully-equipped hospital ships were sent from England, and two sailing ships were provided in India as hospital ships for Indian troops.

The question of transport animals was Sir Robert Napier's first care. The Punjab contingent had its own disciplined mule corps, the field artillery was carried on elephants; for the rest, mules and muleteers were sought from Persia and Egypt, and camels from Aden. His demand for proper organization of these under British officers and N.C.O.'s was opposed by the Bombay Government. In the end he gained his point, but the corps of transport officers was still in course of formation when the expedition started. The chief medical officer of the force was Inspector-General Samuel Currie, C.B., who had been Field Inspector in the China campaign. The Indian Medical Department supplied 2 Deputy Inspectors, who were P.M.O.'s of the two divisions; the British Service also provided 2 staff surgeon-majors, 3 staff surgeons and 10 assistant staff surgeons, in addition to the 9 medical officers on the hospital ships. The British units had their regimental surgeons, 3 per battalion, and there were some 28 regimental medical officers of the Indian Army. "The regimental hospital system which is so much favoured in our Service was maintained in all its efficiency, and the other arrangements for the sick, on the general hospital plan, as a subsidiary to it." [1]

A glance through the voluminous correspondence printed among the Parliamentary Papers relating to the expedition gives some idea of the work saved by our War Establishments and Mobilization Equipment Tables. From a report supplied by an assistant surgeon with local knowledge, it was anticipated that the highlands would be healthy, though dysentery would be a menace throughout. In the lowlands, wells must be protected after sunset, "or the water would be contaminated by the deposit of certain ova that develop into worms in the stomach, which are difficult to eradicate." It was advised that men should march with their trousers tucked into their socks to avoid the bites of sandflies—a sound precaution, though recommended apparently more as a preventive of guinea-worm than of fever. That the writer appreciated the possible source of water as a transmitter of this disease is shown by the advice which followed, to always wash in running streams and not in stagnant pools. He issued a special warning against allowing the native women of

[1] Inspector-General Currie's Report.

the plains to approach the troops, as many were affected with a virulent form of syphilis. In addition to this, the Secretary of State for India, Stafford Northcote, was approached by various well-meaning, if not always disinterested persons, with suggestions which all had to be considered and reported on. A surgeon of the Guards testified to the value of an extract of watercress as an antiscorbutic. The extract was a proprietary one, and the Director-General hesitated to advise its adoption in preference to the recognized remedies. Mr. Calvert, the well-known manufacturing chemist, insisted on the value of a dilute solution of carbolic acid in discouraging flies from biting. In writing to the Governor of Bombay, Sir Stafford Northcote ventured somewhat diffidently to mention a small suggestion of his own. "With reference to the means of purifying water, a simple method is to provide each soldier with a small piece of alum to carry in his pocket in order that by attaching a piece of string and allowing it to be passed to and fro in the water a sediment may be formed." In the end each soldier was given a "pocket filter." As his kit already weighed fifty-eight pounds, we are not surprised to hear that most of the filters were left at the base.

An advance party landed at Malkatta in Annesley Bay on October 4, and on the 21st an advanced brigade arrived at Zula, a mile away, which was finally selected as a landing place. This was a serious mistake. The preparation of the base had hardly begun, though a pier, an essential necessity, had been started. Very little water had been found, and there were not even rations. Three thousand men and a thousand animals were therefore cooped up for nine days on board ship in the Red Sea while tanks and casks of water were landed with the utmost difficulty and labour on the shelving shore. Mules arrived from Suez with a cosmopolitan collection of muleteers and without any water. The muleteers had no sanitary discipline, and there was no one to enforce it. There was no conservancy, the offal of the slaughter-house was not cleared away, and the air was poisoned by the unburied bodies of horses, mules and camels who perished from neglect, disease, or actual starvation. Until Sir Charles Staveley arrived with part of his Division on December 4 there was chaos.

Under a directing hand order was established, and the mess was, we may suppose, gradually, and with infinite labour, cleared up. Fortunately the circumstances required that the troops as they arrived should be pushed on across the desert to the foot-hills, or we can hardly believe that they would have escaped a serious epidemic. On January 2 Sir Robert Napier landed, and his staff surgeon, Lumsdaine, exerted himself heroically as a sanitary officer. Whether the experiment of a detachment of sanitary police, instituted in China, was repeated is not mentioned in the reports, but, besides the invaluable corps of Indian Sappers and Miners (seven companies), there was a Bombay Army Works Company, 1,000 strong. Fresh troops came in, the Navy arrived, a condensing apparatus was set up on shore and a railway started across the desert to Kumayli. The

hospital ships anchored off the shore formed the base hospital. For followers, two large general hospitals were formed at Zula and Kumayli. The three ships, "Mauritius," "Golden Fleece," and "Queen of the South," each provided accommodation for 58 officers and 600 men in cots. A staff surgeon and 2 junior medical officers came out in each ship. Forty-two privates, 3 colour sergeants and 6 other N.C.O.'s of the Medical Section of the Army Hospital Corps were distributed between the ships, and also 29 privates, 3 serjeant-majors, and 2 other N.C.O.'s of the Purveyor's Section, each detachment under an Assistant Purveyor. The whole were controlled by Staff Surgeon-Major T. Guy as superintendent. The general medical control of the base and lines of communication was in the hands of Deputy Inspector-General Pelly of the Indian Service, P.M.O. 2nd Division. By the end of the month a post had been established twelve miles beyond Senafe, which stands on the plateau some seventy miles from the disembarkation point, and at a height of 7,690 feet. Between Senafe and Zula there were now 7,900 troops. The returns show that no more than 100 were on the sick list.

On January 25 the advance began in earnest with two divisions. A squadron of Indian cavalry, two companies of sappers and miners and five Indian infantry battalions remained at Zula. The local Emir was conciliated, though no precautions in guarding the communications were neglected. On the 31st Headquarters were at Senafe, and on February 6 at Adigrat, where another permanent entrenched post was established. Antalo, eighty miles further south, was reached on March 2, after toilsome marches over difficult and dangerous mountain paths. This became the site of a main depot. The 2nd Division now took over the 120 miles of communications between Antalo and Senafe, and the march was continued on the 12th with three brigades. On March 14 the troops crossed the Amba Alaji Pass (10,000 feet) and on the 22nd were at Lat. By this time half the force had become an armed working party and the other half an armed transport corps. Here baggage and transport were cut down to the utmost minimum. No private baggage was allowed and the officers slept twelve to a tent, the men twenty. There was some heavy rain, but change of clothes could not be carried. Up to this point depot hospitals had been set down at Senafe and Antalo. The reduction of sick transport necessitated the formation of a third depot hospital at Adigrat, and others at more frequent intervals as the advance proceeded. Between Antalo and Magdala there was one at Dildi (24 miles), another at Sindi on the Wadila Plain (50 miles), and finally one on the bank of the Bashilo River (20 miles) within 7 miles of the fortress.

On April 9 Napier had brought nearly six thousand men to the summit of the Talanta plateau whence the camp of Theodore's army could be distinguished across the Bashilo Valley, and the final advance commenced. On the following day he moved down to the river. In the afternoon, in heavy rain, a force of about 3,000 Abyssinians poured down from the

heights on which the town stood, advancing in good order and charging again and again. They were mowed down by the fire of the Snider rifles and the Armstrong battery and, after four hours, retired steadily, having inflicted a loss on the British of no more than twenty wounded. During the fight the Field Hospital, which accompanied the advance in charge of Surgeon-Major Wyllie, received the casualties, who were brought in by bandsmen and Punjabi mule drivers under the direction of two combatant officers. Early the following morning (April 11) the town was carried by the 33rd (1st Duke of Wellington's Regiment) supported by the 45th (1st Sherwood Foresters).[1] Among the 3,500 troops present there were fifteen wounded. Theodore was found dead. Surgeon Lumsdaine, who was ordered to examine the body, reported: "Gunshot wound on back of head, inside of mouth scorched, palate blown away, death self-inflicted." The fortifications were blown up, and the town evacuated on the 19th. There was no loot worth mentioning.

During the return journey there was some trouble from marauding tribesmen, and some followers were lost. Fatigue and frequent rain rendered the march back even more trying than the advance. On June 18 the last of the transports had left Annesley Bay.

"Upon the whole this was perhaps the most difficult and dangerous enterprise on which a British army was ever engaged. . . . Never were men more severely worked nor subjected to greater privation and hardship; and it must be remembered that all exertion was the more exhausting to them owing to the rarefaction of the air of the upland. Yet though heavily loaded, and traversing terrible ground, they never failed and never complained, accepting cold, wet, and hunger with equal cheerfulness."[2]

The battle casualties, of which two ended fatally, have been detailed above. In an average strength of 2,689 British troops, the daily sick amounted on the average to 157, or 58 per 1,000. The hospital admissions were at the rate of no more than 750 per 1,000 per annum. There were 46 deaths, including 18 from dysentery and 8 from heat stroke. Bowel complaints accounted for about a quarter of the admissions, and there were cases of intermittent fever, probably mainly relapses in men affected in India. 333 were invalided. Of the Indian troops 284 died and 570 were invalided. The casualties among followers appear to have been very heavy. Of the 2,000 Bengal kahars, 235 died and 545 were invalided.

Ration beef was of poor quality and necessarily frequently deficient during the march through the mountains, when the men also missed their dram of rum. Chollet's compressed vegetables were issued. There were a few cases of scurvy among the Indians.

There seems to have been no important development in ambulance

[1] This regiment only joined the advanced troops on the Talanta Plateau. In twenty-four days they had marched 300 miles, the last 70 over the Amba Alaji Pass (10,000 feet) and through the Tacassi and Jeddah ravines. A very fine performance.

[2] Fortescue.

transport during the campaign. Bullock ambulance carts were sent, and little used; mule cacolets were useless, as the type of mule was too small to carry them. Doolies, dandies, and hammocks, especially the first, were employed for serious cases, but put a terrible strain on the bearers, twelve of whom were barely sufficient to carry the Indian dooley through the mountains. Pack mules were employed for light cases. Camel kujawahs were sent but rarely employed. Sir Robert Napier referred to the great value of the double-seated camel saddles used for minor cases between Antalo and Kumayli. From this point, on the return journey, presumably the railway was used. The regimental scale of sick transport allowed was 3 mules for hospital tents, 12 for sick transport, 12 for stores, and 36 dooley bearers. As the difficulty of the advance increased, a definite percentage was fixed at one dooley and two pack mules per 100 men with an extra fifteen doolies to the field hospital. The field, depot, and regimental hospitals had each three double and two single cloth bell tents.

Though the strain on the troops was a very heavy one, the climatic conditions experienced in this campaign do not seem to have been excessively severe. None the less the Medical Services deserved the congratulations they received on their contribution to the low sick-rate and mortality.

Sir Robert Napier was reputed a keen sanitarian, and seems to have appreciated the usefulness of his medical staff. District sanitary officers were appointed for Zula, Kumayli and Senafe. Two medical officers, Surgeons Lumsdaine and Martin, were sent to make a preliminary survey of the approach to the Plateau. The route which they suggested was accepted, and the General in his despatches gave them much credit for their wise selection.

Medical Staff, Abyssinia.

Inspector-General S. Currie, C.B.; Staff Assistant Surgeon W. T. Martin, Secretary; Surgeon-Major T. Moorhead, Sanitary Officer; Deputy Inspector-Generals G. Mahaffy and S. M. Pelly (both I.M.D.), in charge 1st and 2nd Divisions; Surgeon-Major T. Guy, R.A., Superintendent Hospital Ships; Surgeon J. Lumsdaine, Staff Surgeon.

Besides the Staff the following were mentioned in despatches: Surgeon-Major Wyllie, I.M.D., in charge Advanced Field Hospital; Surgeon C. D. Madden (4th Foot), in charge 1st Brigade Field Hospital; Surgeon N. H. Stewart, 3rd D.G.; Surgeon James Sinclair, 33rd Foot.

Authorities.

A.M.D. Report, 1867; Parliamentary Papers, Abyssinia; Frontier and Overseas Expeditions from India, vol. vi; Fortescue's History of the Army, vol. xiii. A Medical History of the campaign was published for the Prussian Government by Dr. Wilhelm Roth.

heights on which the town stood, advancing in good order and charging again and again. They were mowed down by the fire of the Snider rifles and the Armstrong battery and, after four hours, retired steadily, having inflicted a loss on the British of no more than twenty wounded. During the fight the Field Hospital, which accompanied the advance in charge of Surgeon-Major Wyllie, received the casualties, who were brought in by bandsmen and Punjabi mule drivers under the direction of two combatant officers. Early the following morning (April 11) the town was carried by the 33rd (1st Duke of Wellington's Regiment) supported by the 45th (1st Sherwood Foresters).[1] Among the 3,500 troops present there were fifteen wounded. Theodore was found dead. Surgeon Lumsdaine, who was ordered to examine the body, reported: "Gunshot wound on back of head, inside of mouth scorched, palate blown away, death self-inflicted." The fortifications were blown up, and the town evacuated on the 19th. There was no loot worth mentioning.

During the return journey there was some trouble from marauding tribesmen, and some followers were lost. Fatigue and frequent rain rendered the march back even more trying than the advance. On June 18 the last of the transports had left Annesley Bay.

"Upon the whole this was perhaps the most difficult and dangerous enterprise on which a British army was ever engaged. . . . Never were men more severely worked nor subjected to greater privation and hardship; and it must be remembered that all exertion was the more exhausting to them owing to the rarefaction of the air of the upland. Yet though heavily loaded, and traversing terrible ground, they never failed and never complained, accepting cold, wet, and hunger with equal cheerfulness."[2]

The battle casualties, of which two ended fatally, have been detailed above. In an average strength of 2,689 British troops, the daily sick amounted on the average to 157, or 58 per 1,000. The hospital admissions were at the rate of no more than 750 per 1,000 per annum. There were 46 deaths, including 18 from dysentery and 8 from heat stroke. Bowel complaints accounted for about a quarter of the admissions, and there were cases of intermittent fever, probably mainly relapses in men affected in India. 333 were invalided. Of the Indian troops 284 died and 570 were invalided. The casualties among followers appear to have been very heavy. Of the 2,000 Bengal kahars, 235 died and 545 were invalided.

Ration beef was of poor quality and necessarily frequently deficient during the march through the mountains, when the men also missed their dram of rum. Chollet's compressed vegetables were issued. There were a few cases of scurvy among the Indians.

There seems to have been no important development in ambulance

[1] This regiment only joined the advanced troops on the Talanta Plateau. In twenty-four days they had marched 300 miles, the last 70 over the Amba Alaji Pass (10,000 feet) and through the Tacassi and Jeddah ravines. A very fine performance.

[2] Fortescue.

transport during the campaign. Bullock ambulance carts were sent, and little used; mule cacolets were useless, as the type of mule was too small to carry them. Doolies, dandies, and hammocks, especially the first, were employed for serious cases, but put a terrible strain on the bearers, twelve of whom were barely sufficient to carry the Indian dooley through the mountains. Pack mules were employed for light cases. Camel kujawahs were sent but rarely employed. Sir Robert Napier referred to the great value of the double-seated camel saddles used for minor cases between Antalo and Kumayli. From this point, on the return journey, presumably the railway was used. The regimental scale of sick transport allowed was 3 mules for hospital tents, 12 for sick transport, 12 for stores, and 36 dooley bearers. As the difficulty of the advance increased, a definite percentage was fixed at one dooley and two pack mules per 100 men with an extra fifteen doolies to the field hospital. The field, depot, and regimental hospitals had each three double and two single cloth bell tents.

Though the strain on the troops was a very heavy one, the climatic conditions experienced in this campaign do not seem to have been excessively severe. None the less the Medical Services deserved the congratulations they received on their contribution to the low sick-rate and mortality.

Sir Robert Napier was reputed a keen sanitarian, and seems to have appreciated the usefulness of his medical staff. District sanitary officers were appointed for Zula, Kumayli and Senafe. Two medical officers, Surgeons Lumsdaine and Martin, were sent to make a preliminary survey of the approach to the Plateau. The route which they suggested was accepted, and the General in his despatches gave them much credit for their wise selection.

Medical Staff, Abyssinia.

Inspector-General S. Currie, C.B.; Staff Assistant Surgeon W. T. Martin, Secretary; Surgeon-Major T. Moorhead, Sanitary Officer; Deputy Inspector-Generals G. Mahaffy and S. M. Pelly (both I.M.D.), in charge 1st and 2nd Divisions; Surgeon-Major T. Guy, R.A., Superintendent Hospital Ships; Surgeon J. Lumsdaine, Staff Surgeon.

Besides the Staff the following were mentioned in despatches: Surgeon-Major Wyllie, I.M.D., in charge Advanced Field Hospital; Surgeon C. D. Madden (4th Foot), in charge 1st Brigade Field Hospital; Surgeon N. H. Stewart, 3rd D.G.; Surgeon James Sinclair, 33rd Foot.

AUTHORITIES.

A.M.D. Report, 1867; Parliamentary Papers, Abyssinia; Frontier and Overseas Expeditions from India, vol. vi; Fortescue's History of the Army, vol. xiii. A Medical History of the campaign was published for the Prussian Government by Dr. Wilhelm Roth.

THE NEW ZEALAND WARS, 1860-1869.

Between 1860 and 1869 occurred the series of military operations known as the Second New Zealand War, in which the British troops employed rose at one time to as many as 9,000. These operations mainly consisted in the movements of small columns through difficult bush country, and with the poorest transport facilities, against a brave and determined enemy, who by no means came out always second best. They usually involved an attack on a *pa*, or fortified enclosure, against which field artillery could make small impression. The fighting was mainly in the Province of Auckland, in the town of which there was a general hospital. Stationary field hospitals were set down in some of the larger occupied villages, and small medical posts were established in some of the numerous block-houses built throughout the zone of operations. The medical equipment with the columns was carried on pack-horses, the sick and wounded were usually transported on native litters; occasionally light drays and one-horse ambulances could be used. In 1866 there was a detachment of sixty-nine men of the Army Hospital Corps in the country.[1]

The capabilities of the enemy were at first underrated. An ill-judged and ill-directed frontal attack on one of their positions in June, 1860, cost the 40th Foot and a small Naval Brigade sixty-four casualties, when Major-General Pratt, who commanded in Australia, decided to assume personal control. The campaign of Taranaki followed, which lasted till May, 1861, and cost the regular troops 211 casualties. The Principal Medical Officer during this time was Surgeon-Major J. Mouat, V.C., of Balaklava fame.

In June, 1863, hostilities were resumed, when there were six British infantry battalions in the island supported by colonial militia. Sir Duncan Cameron was now in command. During an attack at Rangiriri in October, Assistant Surgeon W. Temple of the Royal Artillery won the V.C. for his attention to the wounded under continuous heavy fire. A feature of the engagement was the generous conduct of the Waikato chief Te Oriori, who, at great personal risk, carried one of our wounded officers under cover, being himself wounded in the performance of this chivalrous action. The Maoris as a whole acquired the respect and admiration of our men, no less for their bravery than for their sportsmanlike behaviour.

In April, 1864, a British force suffered a severe repulse in an attack on what was known as the Gate Pa, near Tauranga. The assaulting troops and Naval Brigade retreated from the Pa in sad disorder leaving 12 officers and 100 men dead or wounded on the ground. On this occasion Assistant Surgeon W. G. Manley, another Artillery M.O., was recommended for the V.C. This officer remained with the wounded to the last, "ministering to their wants with as much sangfroid as if he had been performing an operation at St. George's Hospital." Assistant Surgeons B. J. Henry, E. O'Connell and A. O. Applin were also mentioned in despatches.

[1] Col. Fred Smith gives the distribution of the A.H.C. this year as follows; Home 639, New Zealand 69, Canada 43, Malta 44, Cape 29, Jamaica 20, other colonies 62.

A further series of operations under Sir Trevor Shute, in which the officers of the Medical Department were congratulated on their zeal and efficiency, is described by the P.M.O., Deputy Surgeon-General Alexander Gibb, in the A.M.D. Report of 1866. During the years 1863-65 the number of deaths in action or from wounds is stated to have been 688 in a strength of about 8,000. The general health seems to have been good. Scarlet tunics were discarded for loose blue jumpers worn over the belts, and for head-gear forage caps were used, with a white cap cover. The men carried a "swag" with blanket, great-coat and ground sheet.

Among the officers who won distinction in the war was Surgeon W. A. Mackinnon, of the 57th, later Surgeon-Major and Sanitary Officer to the force. On one occasion, after the remaining officers had fallen, he led his regiment in a successful assault on a position, receiving, on leaving the country, the thanks of the New Zealand Government and the C.B. Another recipient of the Bath was Surgeon-Major Anthony Home, V.C.

Besides the account of the operations during 1866-67 mentioned above, there are reports on the surgery of the war, and a sanitary history, in the A.M.D. Report of 1865, the former by Mouat, the latter by Mackinnon.

Current Literature.

The Influence of Diet on Caries in Children's Teeth. Medical Research Council, Special Report Series, No. 159.

The Committee upon Dental Disease designed and directed this investigation at Birmingham with the co-operation of the medical staff of the local authorities there.

The work follows on the reports by Mrs. Mellanby on the part played by constituents of the diet in the development and health of the teeth.

The present investigation was begun in 1928, so it is not yet possible to assess the results in teeth which were in the developmental stage at the beginning of the investigation, but it was considered desirable to publish the results already arrived at.

Mrs. Mellanby had shown that in young dogs the structure of the teeth could be considerably controlled by the diet given, and that fat-soluble vitamins, particularly vitamin D, were especially active in producing good teeth, relatively resistant to caries. Mrs. Mellanby and Dr. Lee Pattison found that in a hospital for surgical tuberculosis in Sheffield children to whose diet fat-soluble vitamins, especially vitamin D, were added, developed less dental caries than children on ordinary diet and, if

caries was present, there was a tendency to its arrest when vitamins were given.

The present work is an interim report on the results of a large-scale trial carried out at Birmingham in three large residential schools which were under the Board of Guardians at the beginning of the test and, later, under the Local Education Authority.

In all, 835 children from 2½ to 16 years of age were dealt with, all being on a similar satisfactory standard diet, and 400 of them have been under observation throughout the whole duration of the investigation.

In one of the institutions cod-liver oil (containing vitamins A and D) was added to the diet; in another institution treacle (containing no vitamin) was added to the diet; and in the third institution olive oil was given for a time to all the children, but later one group was given olive oil (no vitamin) and another group had olive oil to which radiostol (vitamin D) was added.

The children were carefully examined every six months by a dental surgeon.

The following information was recorded on each child's dental card: (1) Presence and state of eruption of teeth; (2) structure of fully-erupted teeth, as evidenced by surface enamel; (3) presence, situation, size and texture of carious cavities; (4) condition of the gums; (5) condition as regards alignment and occlusion; (6) tartar, stain, attrition, etc.

The committee adopted a standard system of recording and numerically estimating the amount of caries present in a mouth. This is fully detailed in the report.

In the conclusions it is emphasized that the investigation dealt only with the effect of fat-soluble vitamins on the progress of caries, and that in the present report the incidence and the progress of caries only in teeth already erupted are considered.

In groups of children, numbering from sixty-five to eighty-six, it was found that the addition of fat-soluble vitamin to the standard dietary had a very considerable effect in retarding caries in permanent teeth, as compared with the two groups of children to whose food treacle and olive oil respectively were added.

The incidence or extent of caries in the vitamin-fed children was only about one-third of that in the other groups.

Where the children in a school were divided into two groups, olive oil and vitamin D (radiostol) being given to a group of eighty-two children for eighteen months, and olive oil alone being given to the other group of seventy-nine children, it was found that the progress of caries in permanent teeth was much less in the group receiving vitamin D.

In comparing the results from cod-liver oil (vitamins A and D) with those from radiostol (vitamin D) it was found that the former led to less caries.

The rates of increase in caries in the groups of children on olive oil and in those on treacle were practically the same.

Jordan, E. O., and Hall, J. R. **A Case of Food Poisoning apparently due to Staphylococcus.** *Journ. of Preventive Medicine*, 1931, v, 387.

On the evening of Wednesday, March 4, 1931, a serjeant and his wife at Fort Amodor, Panama Canal Zone, were suddenly taken ill with vomiting, diarrhœa and great prostration. Earlier in the evening they had eaten gravy with their evening meal. The gravy had been prepared with the remains of canned chicken left over from a meal on the previous Sunday. Their child, aged 9 years, did not have any gravy at the Wednesday evening meal and remained perfectly well.

The gravy was examined in a laboratory on March 5. No Salmonella-group organisms were found, but on agar plates *Staphylococcus aureus* colonies were abundant, and a broth filtrate was prepared from subcultures of these colonies in the manner previously described by one of the authors.

Five cubic centimetres of the sterile filtrate were swallowed by two volunteers and in two to three hours both vomited and developed mild diarrhœa, while one showed a rise in temperature to 99·2° F.

A day or so later two fresh volunteers swallowed five cubic centimetres of the filtrate. One remained unaffected, but the other vomited and had severe diarrhœa.

Two months later two volunteers swallowed two cubic centimetres of the filtrate. One showed no ill-effects, while the other suffered from severe vomiting, severe diarrhœa with blood in the stools, dizziness, headache, generalized pain and fever, the symptoms beginning about three hours after swallowing the filtrate.

The authors consider that the close correspondence of symptoms and time of onset in the patients and in the volunteers supports the view that the products of staphylococcal growth caused the illness of the two patients.

The symptoms agreed with those of previously reported cases in which staphylococcal poisoning was presumed to be the cause of illness.

References are given.

Eimer, K. **Atophan Poisoning and its Treatment.** *Deutsch. med. Woch.*, 1931, No. 39, p. 1663.

A case of atophan poisoning is recorded by the writer because German textbooks and journals give few references to atophan poisoning, although both Nordic and Anglo-American literature have lately recorded numerous cases of yellow atrophy of the liver following the administration of atophan. Also the author considers his case worthy of record on account of recovery after very severe illness and, presumably, considerable liver damage.

The patient, a male aged 52, had suffered for six months from arthritis of the wrists and knees, for which salicylates, baths, light and other usual forms of treatment had been employed.

On January 22, 1931, he was placed on 0·5 gramme of atophan three times a day and, five days later, the dose was increased to one gramme three times a day. On February 13 the joints had improved considerably, but by February 28 the general condition was not so good. On March 3 jaundice was evident and the administration of atophan was stopped. The temperature rose next day to 38·9° C. and a morbilliform rash was evident all over the trunk. The jaundice colour became deeper, the urine became dark brown in colour, and the stools were of a greyish colour. Hæmorrhagic spots appeared on the limbs a day or two later, and the patient was then given calcium daily.

On March 11 patient was put on sixty grammes of grape sugar twice daily and twenty units of insulin twice daily. The rash began to fade in a day or two and the jaundice gradually decreased, although the skin remained deeply coloured. By March 20 the temperature, which had reached 40° C., was subsiding. The blood-sedimentation rate was markedly accelerated, red blood corpuscles were 2,200 per cubic millimetre, and leucocytes were 15,200 per cubic millimetre, with polymorphs 32 per cent, lymphocytes 65, and monocytes 3 per cent. The patient still looked seriously ill, and there had been loss of appetite from the time the jaundice appeared. Duodenal irrigation with magnesium sulphate was begun, and was repeated every two days. The condition gradually improved, and the grape sugar, insulin and magnesium sulphate treatment were stopped. The joints had also improved.

On April 8 the patient was able to get up, but on the following day the magnesium sulphate lavage was resumed as the jaundice colour of the skin was still well marked, and this treatment was continued till April 20, by which time the jaundice had practically disappeared.

On April 28 the Van den Bergh test, direct, was positive, and indirect, negative. On May 4 the galactose liver function test gave a normal result. On May 18 the Van den Bergh test, direct and indirect, was negative, and the patient was able to go home.

Reviews.

NOGUCHI. By Dr. Gustav Eckstein. London and New York: Harper and Brothers. 1931. Pp. ix + 419. Price $5.00.

Written with fine dramatic effect, which is well sustained throughout the whole book, this wonderful life story of a young Japanese genius grips the reader from the very first page. One can read the book and read it again and like it even better the second time, for the staccato present-tense style in which it is written, though perhaps strange at first, becomes very attractive. All the world knows of Noguchi, the Japanese peasant

boy who became through his own endeavours one of the world's greatest scientists and died in Africa in an heroic effort to solve the mystery of yellow fever.

Dr. Eckstein is to be congratulated in giving us the story of Noguchi's life.

A. C. H. G.

BAILLIÈRE'S SYNTHETIC ANATOMY. Parts XI and XII. By J. E. Cheesman. London : Baillière, Tindall and Cox. Price 3s. each.

Part XI deals with the male perineum and Part XII with the female perineum.

Each part consists of twelve coloured plates on transparent material. A key is provided, printed as an extension on either margin of a blank page, which is placed under the drawing being examined.

These plates should be useful to surgeons and others, as they are practically equivalent to dissections in twelve depths.

Only one part—the brain—now remains to complete the series for the whole body, and this is in course of preparation.

GASTRIC ACIDITY: An Historical and Experimental Study. By John Douglas Robertson, M.D., Assistant Chemical Pathologist to the Middlesex Hospital, London. London: John Murray, for the Middlesex Hospital Press. 1931. Pp. vi + 76. Price 5s.

While the earlier pages of this small work are devoted to a historical sketch of the evolution of the analysis of gastric secretions, this part is only a preliminary to a concentration on the question of the significance of lactic acid in the gastric juice. Since 1892, when Boas stated that its significance is equal to that of hydrochloric acid and that it is a more certain criterion of the presence of cancer, there has been unending controversy as to whether the presence of lactic acid in the gastric juice could be used as a specific sign of malignant disease of the stomach. The historical aspects of this have been considered in detail and a summary made of the various views for and against it. As recently as 1928 we have had definite pronouncements made by competent observers that the presence of the acid is pathognomonic of carcinoma of the stomach.

The results of Dr. Robertson's experiments negative this view and prove that lactic acid in the stomach is produced by fermentation and not by secretion of the cells of a malignant growth. That lactic acid is usually present in carcinoma of the stomach he admits, but it is not an early sign; when lactic acid makes its appearance, the growth is commonly too advanced to be amenable to treatment. The author's experiments seem to afford no chance of error as to the correctness of his views.

Tables of results of tests made on seventy-four cases and a long list of references add to the value of the work.

A HANDBOOK FOR NURSES. By J. K. Watson, M.D.Edin. Ninth Edition. London: Faber and Faber, Ltd. 1931. Pp. xii + 1055. Price 10s. 6d. net.

This popular and well-known handbook contains much new material and many new illustrations and after the thorough revision it has undergone it will be found to be a complete textbook of general nursing.

The book is most comprehensive and up to date so that those who contemplate taking the examinations of the General Nursing Council will find within its pages all the information required.

The text is clear, the descriptions are lucid and the illustrations good. The re-introduction of test examination questions is a welcome addition and a full index terminates this useful work of 1055 pages. R. P.

MILITARY PREVENTIVE MEDICINE. By George C. Dunham, M.A., M.D., D.P.H., D.T.M. & H.; Major, Medical Corps, U.S. Army; Director, Department of Sanitation, Medical Field Service School, U.S.A. Second Edition. 1931. Pp. xxiv + 1062.

The first edition of this book appeared in 1930, and was reviewed in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS of July, 1931. The fact that a second edition has appeared within a year of the first is an indication of the popularity and usefulness of this publication.

The second edition has been improved by bringing it up to date and by a number of new illustrations, and its value would be still further enhanced if Chapters V, IX and X were fully illustrated.

In view of recent research into the part played by mess utensils in the spread of saliva-borne disease, the figures in Chapter XII illustrating how this risk is obviated in the field are of particular interest.

The two new chapters make a useful addition to the book, as the two subjects dealt with are of great importance in the practice of preventive medicine.

In Chapter XXVII the author deals only with the administrative aspect of physical examinations, and does not touch on the methods of examining different parts of the body. He very rightly stresses the importance and part played by efficient physical examination in preventive medicine. An interesting table gives the different occasions on which physical examinations of officers and other ranks are carried out, and the rest of the chapter is taken up mainly with an elaboration of the object of these examinations. Three useful figures illustrate the organization of an examining board.

It is interesting to note that the minimum height for the U.S. Army is 64 inches, which is the same as that recently adopted in the British Army, and the author wisely points out that the Government has little to gain and much to lose in accepting a man who is actually or potentially incapable of performing military duties.

Chapter XXVIII deals with vital statistics and is confined to a description of those statistics which are normally required in the army. There are explanations of how they are calculated and illustrations of how statistics can be shown graphically. A very useful chapter in any manual of preventive medicine. The last two lines but one on the first page of this chapter should be reversed. P. H. H.

BAINBRIDGE AND MENZIES' ESSENTIALS OF PHYSIOLOGY. Seventh edition. Edited and revised by H. Hartridge, F.R.S. London: Longmans, Green and Co. 1931. Pp. x + 585. Price 14s.

The demand for another edition of "Bainbridge and Menzies' Essentials of Physiology" has given Professor Hartridge, the editor, the opportunity of re-writing the various chapters. This book has now reached its seventh edition, and thus requires no introduction to our medical readers. That there should have been a demand for a further edition within a comparatively short space of time, emphasizes that students of medicine are alive to the necessity of keeping in touch with the most recent developments in physiology, in order to understand the problems of medicine.

While the book adheres in general to the lines of previous editions, it has been divided into somewhat smaller chapters. Two new chapters have been introduced, one on the regulation of the acid base balance, and the other on the regulation of the salt balance of the body. Due prominence has been given to the chapters on the ductless glands and sex organs, and recent knowledge of these important branches of the subject has been carefully inserted.

The book, dealing as it does with such a complicated subject in comparatively few pages, is easy to read, and sets forth the essentials in a clear and concise manner.

Medical officers will find this book handy for quick reference, and we specially recommend it to those who are desirous of revising the subject in their preliminary study for the higher degrees in medicine.

L. T. P.

Correspondence.

SOME NOTES ON EQUIPMENT.

We have received this letter which we think will be of interest to our readers. Extracts from the Standing Orders are given below :—

Dear Sir,—With reference to "Some Notes on Equipment" by Major J. H. M. Frobisher, O.B.E., published in the Journal of the Royal Army Medical Corps for August, 1931, it might be of interest to your subscribers to know that provision has been made in paragraph 48 (vii) of Standing Orders for the Australian Army Medical Services, 1929, for a somewhat similar "Unit" to that referred to on page 121 of Major Frobisher's article.

Since the issue of the above-mentioned Standing Orders an amendment has been published in Australian Army Order 228/1930, adding further equipment for this unit (Appendix No. 39). This equipment is based on the experience gained by Australian Divisional Resuscitation Teams in France and Australian Mobile Operating Units in Palestine.

Army Head-Quarters,
Victoria Barracks,
Melbourne, S.C. 1.
October 14, 1931.

Yours faithfully,
G. E. Sykes, *Major,*
Staff Officer, Medical Services.

Standing Orders for Australian Army Medical Services, 1929.

Section V.—Duties of Officers in the Field.

(2) *War Service.*

... ...

48. A.Ds. M.S. of Divisions will—

... ...

(vii) Arrange subject to the orders of superior authority for a surgical resuscitation team for their respective divisions to supplement the work of ambulances at M.D.S. or A.D.S., and carry out urgent resuscitation work in cases which, in the opinion of the C.O. Ambulance, are unlikely to survive the journey to the C.C.S.

The team to consist of two officers (one major and one captain) and four orderlies (one N.C.O.), to be drawn from the ambulances, unless otherwise ordered by superior authority.

The team will be supplied with the quickest means of transport, and take with them equipment as specified in Appendix 39.

... ...

APPENDIX NO. 39.

Equipment for Resuscitation Team.

Article		Number	To be drawn from
Surgical instruments, operating, set		1	No. 1 F.S.P.
Splints, dressings, towels, &c.		Qty.	Ambulance concerned
Ether, chloroform		Qty.	,,
Rechauffement box		1	,,
Gum, infusion, set		1	A.D.M. Stores
Gum solution	Doses	16	,,

Article		Number	To be drawn from
Blood-transfusion apparatus—			
Kimpton's flasks..		6	A.D.M. Stores
Robertson's bottle for citrated blood		1	,,
Sod. citrate sol., 3·4 per cent (sterile)		Q.S.	,,
Blood-grouping apparatus—			
Micro. slides		6	Mobile Bac. Laboratory
Capillary pipettes		2	,, ,,
Watch glasses		2	,, ,,
Distilled water	Botts.	1	,, ,,
Sod. citrate (sol. 1·5 per cent.)	Oz.	4	,, ,,
Serums, groups 2 and 3		—	,, ,,
Mosquito forceps (toothed)		4	A.D.M. Stores
Lance's toothed forceps		2	,,
Schimmelbusch mask		1	,,
Mouth gag		1	,,
Tongue forceps		1	,,
Surgical razors		2	,,
Sterilizer, 20 inches		1	,,
Hypodermic syringe		1	,,
Gloves, surgical	Pairs	6	,,
Dishes, kidney		2	,,
Bowls, 10 inches		4	,,
Bowls, small..		4	,,
Dressing containers		3	,,
Acetylene lamp operating box		1	,,
Basins, enamel, washing, 14 inches		3	,,
Stoves, primus		2	,,
Oil cloth, American	Yds.	10	,,
Surgical gowns, jaconet		6	,,
Gas oxygen apparatus		1	,,
Field Service panniers		1	Ordnance

ADDITIONAL EQUIPMENT WHEN AUTHORIZED.

Gowns, surgical, of cotton material		12	A.D.M. Stores
Sterilizer, autoclave, steam pressure, small, portable, to be worked by primus stove		1	,,
Primus stove..		1	,,
Catgut, surgical, sizes 00, 0, 1, 2, 3, 4, hanks	Each size	6	,,
Jars, catgut ..		3	,,
Silk, surgical, sizes 1 and 4, hanks,	Each size	2	,,
Clamps, bowel		2	,,
Butter muslin	Yards	100	,,
S.V.R.	Quarts	1	,,
Mercury, binoid (soloids)		50	,,
,, or solution, 1 in 250 in S.V.R.	Pints	1	,,
Cotton, sewing, white, size 30..	Reel	1	,,
Needles, sewing, sizes 3 and 5, packets..	Each	3	,,
Spray, foot pump, for spraying operating tent		1	,,
Serum, antitetanic	Phials	50	,,
Serum, anti-gas gangrene		50	,,
Retractors, abdominal, large		2	,,
Needles, intestinal, half circle and straight packets	Each	2	,,
Elevator, dura mater..		1	,,
Forceps, skull bone cutting		2	,,
B.I.P.P.	Pound	1	,,

Notices.

OUABAIN.

OUABAIN, a crystalline glucoside extracted from the seeds of *Strophanthus gratus*, is now prepared by Burroughs Wellcome and Co., and issued as "Wellcome" Brand Ouabain in tubes of 0·5 gramme. Ouabain, known as strophanthin-g, crystallizes readily and its purity is easily determined by chemical analysis. It is stated to be the official strophanthin of the German Pharmacopœia and the standard for all medicaments used in cardiology in the United States Pharmacopœia. Clinically Ouabain is said to be superior to amorphous strophanthin because of its ready solubility, and being a pure crystalline substance it is not subject to variation in composition as is amorphous strophanthin.

THE WELLCOME RESEARCH INSTITUTION.

CEREMONY OF LAYING THE CORNER STONE, NOVEMBER 25, 1931.

THE President of the Royal College of Surgeons, the Rt. Hon. Lord Moynihan, K.C.M.G., C.B., M.S., LL.D., on November 25, laid the Corner Stone of the magnificent new building in course of erection for The Wellcome Foundation Limited at the junction of Gordon Street and Euston Road, London.

That it will be a handsome and imposing structure is evident from the original design by the architect, Mr. Septimus Warwick, F.R.I.B.A., which was exhibited in the Royal Academy, 1931.

The Wellcome Research Institution embraces the following affiliated Research Laboratories and Museums: Bureau of Scientific Research, Physiological Research Laboratories, Chemical Research Laboratories, Historical Medical Museum, Museum of Medical Science. The new building will furnish the additional accommodation which is required owing to the recent extensive development of these Research Laboratories and Museums, and will provide facilities further to co-ordinate their activities.

The new building occupies a site measuring 225 feet by 135 feet, part of which was originally occupied by the Foundation's Bureau of Scientific Research and Museum of Medical Science. It will be provided with the most modern scientific research equipment. On the Euston Road frontage there is a colonnade of twelve fluted Ionic columns masking the second, third and fourth floors. A rusticated base extends to the height of the ground-floor storey. The top storey above the columns is recessed from the main building. There are eight floors in all. The elevation to Gordon Street consists of two end pylons with a row of six Ionic columns similar to those on the front.

PHARMACEUTICAL PREPARATIONS BY DR. RICHARD WEISS, BERLIN.

Santuben Treatment of Tuberculosis.—This consists of two parts—an ointment and tablets.

The ointment contains tuberculin, guaiacol, camphor, silica, oil of rosemary and pine, and a base. About an inch of the ointment is rubbed into the skin once a week, a fresh part of the body being selected each time. It is stated that in twenty-four to forty-eight hours a slight reddening and swelling appears and lasts for three to five days at the site of inunction. It is claimed that general and focal reactions are avoided by the application through the skin of this form of tuberculin.

The tablets contain a compound of guaiacol and silicic acid and are taken by the mouth three times a day.

Pancresal.—Pancresal is issued in the form of tablets for the oral treatment of diabetes, and it is stated to be an activated pancreas hormone, each tablet corresponding to fifteen to twenty insulin units.

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VOL. LVIII. FEBRUARY 1932. No. 2.

Journal of the Royal Army Medical Corps.

Original Communications.

MALARIA IN INDIA.

By LIEUTENANT-COLONEL J. E. M. BOYD, M.C., F.E.S.,
Royal Army Medical Corps.

PART I.

IN the Report on the Health of the Army for 1928, Ferozepore heads the list of stations infected with malaria, so perhaps a few notes on the district and on the steps taken and suggested to combat the disease may be of interest to readers of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS.

It is proposed to divide the article into two main sections:—

(*a*) A description of the area under consideration.

(*b*) Anti-malaria works and suggestions.

Ferozepore District, which has an area of approximately 4,286 square miles, is the most southerly of the five districts of the Jullundur Division of the Punjab. Jullundur is said to have been so named after Alexander the Great; the Indian having difficulty in pronouncing his name, called him "Alacjullundur," this being shortened later to the present name.

The founder of the district was probably Firoz Shah Tughlak, though possibly one of the Bhatti chiefs, Firoz Khan, may have been the founder.

The district has a population of about 959,000 and lies between latitude 26° 56 and 31° 11 North and longitude 73°·55 and 75°·37 East.

Ferozepore Cantonment itself lies fifty miles from Lahore and eighty miles from Ludhiana, on the Grand Trunk Road.

The district is bounded to the north-east by the River Sutlej and by

the Kapurthala State, to the north-west and west by the united streams of the Rivers Sutlej and Beas, to the east and south-east by the Ludhiana district and the Indian States of Faridkot, Patiala, Nabha and Jhind, and on the south and south-west by the Hissar district, Bikaner and Bhawalpur.

The surface of the district slopes very gently from the north-east towards the south-west, the average fall being about one and a half feet to the mile. It is of alluvial formation and contains no hills.

Ferozepore Cantonment is about 650 feet above sea-level. At the Ludhiana border the river is about 725 feet above the sea; at the Bhawalpur border, 115 miles down stream, the level is 565 feet.

The River Sutlej was crossed until quite recently by the Kaiser-i-Hind railway bridge at about five miles from Ferozepore City. This bridge, which was built in 1886, was 4,000 feet long, consisting of twenty-seven piers, with a cart road above the railway. The dismantling of this bridge was completed towards the end of 1929, following the completion of a large barrage for conveying water to the Bikaner desert. The barrage was opened in 1926, a new bridge having been built which carries the railway and a cart road side by side.

There are several depressions throughout the area, due to old channels of the Sutlej, disused canal beds and such like; these fill up during the monsoon but are usually dry during the rest of the year.

The country is not well wooded, though in some areas low scrub jungle may be found, and along the sides of roads and canals there is usually considerable shade. The most common trees met with are the kikar, shisham, siris and tamarisk, whilst round the villages one sees the banyan and pipal.

Numerous plantations of fruit trees are met with, including the mango, orange, lime, pomegranate and banana, with occasional apricot and grape. Fruit is on the whole of poor quality.

Vegetables, both English and Indian, do well and there is usually a good variety of these to choose from.

Along the banks of the river and in other uncultivated areas are to be found quantities of high jungle grass, the haunt of all kinds of small game.

There is no big game in the district; tigers and leopards were found many years ago but have long since disappeared. Black buck (Indian antelope) and chinkara (ravine deer) were plentiful up to within the past few years but have now moved into the neighbouring States and Jain country; the horns are small and scarcely worth collecting. Nilgai (blue bull) are met with occasionally, but the shooting of these is forbidden in most places.

Wolves are rare, having been hunted by the local natives on account of the reward paid for their destruction. Jackals and foxes are fairly common and have good skins in the cold weather.

Wild pig abound in some places and occasionally give good sport to the local Tent Club, but owing to large hunts frequently organized, chiefly by the Sikhs, the numbers are now markedly less. At some of these hunts hundreds of beaters are engaged, every form of weapon, from shot-gun to club, is used, no respect being shown either to size, age or sex, as the flesh of the wild pig is very highly prized as food.

Otters are sometimes met with in the river or on the large jheels, but as a reward is also paid for these their numbers are less than formerly.

Snakes are common, the cobra, both black and yellow, the common krait and the echis being the chief poisonous species ; several harmless species are also found.

The long-nosed, fish-eating crocodile (gharial) is found in the river, the largest specimens seen by the writer measured about eighteen feet in length. Owing to the large number shot yearly they are now becoming scarce, except at long distances from cantonments. Many years ago I collected ten of varying sizes in one afternoon, whereas now one is lucky to get ten shots in a whole day.

The district is now looked upon as one of the best in the Punjab for the shooting of game birds, visitors coming from many surrounding places for this form of sport. Owing to the great increase in the number of guns owned by Indians, and to the netting and trapping methods employed, some species are not so common as formerly, but black partridge, grey partridge, quail, snipe, curlew and several kinds of plover abound at certain times; sand grouse, both imperial and common, are found in certain areas. The common "blue rock" pigeon and, at certain times, the eastern stock pigeon are to be met with everywhere.

One does not usually include the common house kite and the crow, both scavengers of the worst type, in a list of game birds, but both of these were formerly eaten by the natives, the bazaar value being half an anna and one pice respectively. I have not personally met anyone who has eaten these birds, though possibly the practice still continues, but on more than one occasion have been asked to give the carcase of a jackal to men who wished to eat the flesh; in fact, I have had the skin removed free of charge, the carcase being taken as payment for the work.

The river and numerous jheels abound in many kinds of water birds; geese, several species of duck and teal, while occasional flights of demoiselle cranes are seen in large numbers. Swans have been met with, but not of late years.

Of non-game birds one meets herons, spoonbills, paddy birds, coots, cormorants and dabchicks ; several years ago I saw two pelicans on a sand bank. Vultures, hawks, kites and owls abound. Parrots, minahs, bulbuls are to be seen in most of the gardens and along the main roads. Several species of doves are to be found, but these live a very precarious existence owing to the raids on their nests by crows.

Near the river one may see large flights of very small birds, called "lal

muniah" by the natives; the males are bright red and possess a very pretty note. They are a species of wax-bill and are sometimes seen in shops in England, exposed for sale; the name "abbadobats," by which they are usually known, is said to be derived from Abbotabad, the place from which they are originally said to have been exported.

Good fishing is to be obtained in the river and in some of the larger jheels, the chief species to be met with being the mahseer, rohu, sowal and bachwa; porpoises and large turtles are also common.

Butterflies and moths abound at the commencement of the hot weather and during the rains, two of the most striking species being the "death's head" and oleander hawk moths. During one season I caught as many as sixty distinct species of Lepidoptera in the garden of my own bungalow.

Many species of Coleoptera, Diptera, Hymenoptera and other insects are to be found. White ants are common and speedily destroy the bottoms of wooden boxes if these are not raised from the ground by means of bricks; when ants are "swarming" during the rains, thousands can be destroyed by placing a bath, containing water, under a strong light.

Sandflies are found throughout the year, except in the months of January, February and December. They are most plentiful during March, April, May, August and September. So far the following species have been identified: *P. papatasii*, *P. sergenti*, *P. minutus*, *P. babu*.

Mosquitoes are plentiful; the following species of anophelines have been caught in the cantonment area: *A. turkhudi*, *A. maculipalpis* var. *indiensis*, *A. sinensis*, *A. barbirostris*, *A. subpictus* (= *rossii*), *A. culicifacies*, *A. pulcherrimus*, *A. stephensi*, *A. fuliginosus*. Of these anophelines, I have actually caught the last five species. *A. culicifacies* is the chief vector of malaria in the district.

Spiders, scorpions and other members of the Arachnidæ abound. One particular species of tick is worthy of being mentioned on account of its beauty; it resembles a piece of bright scarlet velvet and is only seen at the beginning of the monsoon.

The climate is on the whole healthy. There is a bracing cold weather, beginning in November and ending in the middle of March, though the nights are cool in October and up to the middle of May. The end of May, the whole of June and part of July are extremely hot, the temperature remaining high until September. The monsoon usually breaks about the middle of July, the period just before the rains being very unpleasant. Should there be a break in the rains in July or August, the conditions become very oppressive, owing to the increased humidity of the air.

Slight showers are usually experienced about the end of December—the "Christmas rains"—and again in March. From the experience of the past few years it appears as if there is a slight alteration in the rainfall; this may be just a coincidence or may be due to increased evaporation caused by large areas being now under cultivation which were formerly barren, and to the opening of large canals in the district.

Thunderstorms with heavy rain and hail occur at times in April and May, and may cause great damage to crops.

Earthquakes are rare and when felt are very slight.

The district is famous for its dust storms, which may spring up at any time, so much so that there is an old proverb, "Kabul ka sarda, Firozpur ka garda," meaning "Kabul for sarda melons, Firozpur for dust." These storms, while they last, are very unpleasant; everything rapidly becomes coated with a thick layer of dust, and since all doors and windows have to be shut, the inside of one's bungalow is very soon hot and oppressive. At the beginning of the hot weather these storms are of almost daily occurrence, their arrival being notified by the unrest and "cawing" of the crows. The air is frequently dust laden for a week at a time.

Provided that ordinary precautions are taken, one should remain healthy during the hot weather, the chief causes of illness being due to constipation, lack of exercise, which should be taken in moderation, over-indulgence in highly iced drinks, both alcoholic and non-alcoholic, and exposure to the sun.

Hot-weather precautions do not concern this article, but from the observations of several years it appears as if these are being overdone in some stations; the remark of a medical officer to the effect that in a certain unit the men were developing bed-sores through want of exercise gives a rather exaggerated picture of what is actually the case, but one would certainly like to see a revival of the old pre-war "Dog and stick parade," at which all available dogs were turned out with a company, each member of which carried a stick and where everything put up by the dogs, from hare to pi-dog, was hunted to the death. These parades were not unpopular with the men and gave them quite a lot of exercise and amusement.

Statistical tables are of little interest, being in most cases inaccurate; they are expensive to produce in print and take up much room, so instead of these a few details may now be given regarding the temperature and rainfall. The highest actual temperature recorded in the shade since 1905 was 126° F. in June, 1910, though a shade temperature of 120° F. is by no means uncommon. The lowest record is that of 28° F. in February, 1905. The winter of 1928-29 was very severe and much damage was done to crops. On the last day of January, 1929, the temperature recorded on the verandah of the British Military Hospital was 30° F.; the reading on the grass must have been several degrees lower.

Rainfall varies considerably in different years, the average being about 17·17 inches; the maximum recorded being 37·74 inches in 1908-09, and the minimum 6·47 inches in 1896-97. Flooding occurs at times during the monsoon, as owing to the flatness of the country the water cannot drain off. In 1900 about six hundred and fifty houses collapsed in Ferozepore City and it was necessary to cut the main Lahore-Ludhiana road to save the Artillery lines in cantonments.

There is little ancient history attached to the district. It is almost

destitute of ancient buildings. None of the present towns or villages date from an earlier period than the reign of Akbar. This is due to the fact that within the last four centuries the whole of the western side of the district has been over-run by the River Sutlej.

The fort of Ferozepore is stated to have been built in the time of Feroze Shah, Emperor of Delhi from A.D. 1351 to 1387, but nothing save a mound, on the top of which is a Mohammadan tomb, marks the spot.

The Manj Rajputs say that the town was named after their chief, Feroze Khan, who lived in the middle of the sixteenth century. The place was desolated by a pestilence in A.D. 1543.

The Dogars occupied Ferozepore in A.D. 1740, and in A.D. 1763-64 Hari Singh, Chief of the Bhangi Misl, seized and plundered Kasur and its neighbourhood. One of the Sirdars in his train was Gurja Singh, who, taking with him his brother Nusbaha Singh and his two nephews, Gurbakhsh Singh and Mastan Singh, crossed the Sutlej near Kasur and took possession of Ferozepore, the fort of which was in ruins. The district then contained thirty-seven villages, the proceeds of which were shared between Gurbakhsh Singh, Burban Dogar and Muhammad Khan, son of Gul Khan, but the two latter joined forces and expelled the former's garrison from the newly-repaired fort of Ferozepore.

In A.D. 1771 Muhammad Khan started for Amritsar with some horses for sale; he was attacked and taken prisoner at his first camp by Gurbakhsh Singh, who then recovered the fort at Ferozepore. In the same year the Sutlej changed its course and carried away or rendered waste all the villages of the district except seven.

Sardah Nihal Singh, one of the followers of Maharaja Ranjit Singh, hemmed in the Ferozeporians, about A.D. 1808, in spite of the protests of Mr. Metcalfe, the British Agent, and shared the produce of the district with one Dhanna Singh. As soon as the latter heard that the British Government had undertaken the protection of all the country south of the Sutlej, he addressed a letter, dated March 28, 1809, to Sir D. Ochterlony, the Agent for Sikh affairs, begging for the Company's protection; this was agreed to. He died in A.D. 1819, leaving his widow Lachman Kunwar as his heiress. Sardarni Lachman Kunwar died in A.D. 1835 and, leaving no children, the heritage of her territory fell to the British Government.

In A.D. 1838, owing to the importance of the place, it was resolved to make Ferozepore the station of an Assistant Political Agent. Mr. Edgeworth was appointed on December 5, 1838, and held the position until relieved by Captain H. M. Lawrence on January 17, 1839.

The first Sikh war broke out in 1845. The Sikhs crossed the Sutlej on December 16, 1845, the battle of Mudki was fought on December 18, 1845, followed by the battle of Firozshah on December 21, 1845, that of Aliwal on January 28, 1846, and of Sobraon on February 10, 1846. The Sikhs withdrew beyond the river, pursued by a British force, which soon after dictated peace under the walls of Lahore. As a result of the war the

British Government acquired Khai, Mudki and all the Lahore territory on the east of the Sutlej.

In 1857 the Indian Mutiny broke out. The following account of events is taken from the Punjab Mutiny Report:—

"At a court of inquiry assembled some time previous to the Delhi mutiny, a Native Officer of the 57th Native Infantry, at Ferozepore, declared that it was the purpose of his regiment to refuse the Enfield cartridge if it was offered to them. This raised a strong feeling of suspicion against the corps, but the 45th Native Infantry, which was not on good terms with the 57th, and had openly declared their contempt of the resolution of the 57th, was considered staunch.

"On the 14th of May, as soon as news, by express from Lahore, of the Delhi disaster reached Brigadier Innes, who had the previous day taken over command, he ordered the entrenched arsenal to be immediately garrisoned by part of Her Majesty's 61st Foot and the Artillery.

"All ladies were also removed thither, and the two regiments of Native Infantry ordered into camp in positions of about three miles apart. The way of the 45th Native Infantry lay past the entrenchment; as they approached, their column insensibly swerved towards the glacis; the movement had barely been observed when they swarmed up the slope and attacked the position. The Europeans in an instant divined their intent, and rushed to the ramparts with the bayonet. The attack was repulsed; but before the 61st could load the sepoys dashed at the gate, whence they were flung back and then with an air of injured innocence they reformed their column and marched quietly with their European officers to the camp.

"During the night the church, the Roman Catholic chapel, the school-house, seventeen officers' houses and other buildings were burnt to the ground by the men of the 45th, but not before the Chaplain, the Rev. R. B. Maltby, failing to obtain a guard of Europeans, had boldly rushed into the blazing church, through the infuriated sepoys, and had succeeded in rescuing the registers out of it.

"On the 14th the treasury was moved into the entrenchment, and it was discovered that of the 45th Regiment, there remained only 133 men; the rest, with a large part of the 57th, had deserted. The remaining portions of these regiments were subsequently disbanded.

"Danger impended over this district from both north and south. To avert the threatened incursion of the mutinous troops from Lahore, the large ferries on the Sutlej were guarded and the boats from the small ones sent to Harriki. To check the approaches of the wild tribes from Sirsa and Bhattiana, General Van Cortland, in a fortnight, raised a levy of 500 Sikhs, a force which, subsequently uniting with Raja Jawahir Singh's troops and other bodies sent down from time to time by the Chief Commissioner, amounted to 5,000 men of all arms, and performed excellent service in Sirsa and Hissar.

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"Major Marsden received information at one time that a fakir, named Sham Das, was collecting followers with a treasonable intent. He promptly moved against the rebel and coming up with him by surprise, attacked and completely defeated him with the loss of several men. Sham Das was seized and executed. This took place in June, near Jaitu or Saidoke; Sham Das had collected about 4,000 adherents and Major Marsden had with him a wing of the 10th Light Cavalry and two guns.

"This act of vigour on the part of Major Marsden was a most important step in the preservation of peace in the district; for at that time any show of success for the evil-disposed would have raised the whole region in revolt.

"In the western division 157 extra men were entertained in the police establishment, and the feudatory chiefs furnished a body of 200 horse and 40 foot. Every highway robber was executed at once.

"This display of severity, with the presence of General Van Cortland's force and increased energy on the part of the civil authorities, preserved the peace of the district well. On the 11th July, the 10th Light Cavalry was, as a precautionary measure, dismounted and disarmed; but on the 19th August the men made a rush at their horses, cut loose about fifty of them, and seizing every pony or horse they could find in the station, including many officers' chargers, mounted and rode off to Delhi. With the connivance of the native horse-keepers of the Artillery, they also attacked the guns, but were repulsed, though not until three of the 61st Regiment had been killed and three wounded, of whom one was a female. They also cut down Mr. Nelson, the Veterinary Surgeon of their Regiment.

"Of the 142 mutineers captured, 40 were executed and the remainder, with 25 of the artillery horse-keepers, transported or imprisoned. In the jail eighteen persons, including the Nawab of Rania, who had been captured by Mr. Ricketts in the Ludhiana District, were hanged.

"The siege train was despatched from the arsenal on August 18th, when more than two thousand cart-loads of munitions of war were sent to Delhi, during the siege."

The colours of the mutinous regiments were placed in the Armoury of the Arsenal, where the remnants may still be seen, though they are in a very dilapidated state and fall to pieces if touched.

Ferozepore City lies about two miles north of the cantonments and three miles from the River Sutlej. It is 645 feet above sea-level. The wall surrounding the city is "kachha" and is pierced by ten gates, of which the Delhi and Ludhiana towards the south, the Makhu towards the east, the Bansanwala towards the north, and the Kasur and Multan to the west are the most important. A metalled road, 23,870 feet long, circles the wall. There are no very imposing buildings in the city, but there are several bazaars; in one, the Ludhiana, large numbers of wheels for country carts are made; the carpenters in neighbouring villages, who make the bodies of the carts, are not able to make the wheels. The gate of this

bazaar is said to have been copied by Mr. Knox, Deputy Commissioner (1867-68 and 1869-71), from some gate in Baghdad, whence it is called the "Baghdadi" Gate.

Outside the city are the dispensary and school, both situated on the Knox Road, about 100 yards from the Delhi Gate; the Municipal Hall and Jail are also situated on the Knox Road.

Near the cantonment railway station is the Francis Newton Mission Hospital, founded by the American missionaries about 1870; much good work is done at this hospital amongst the poor.

The Ferozepore Cantonments were first constituted in 1839 and have since then been continuously occupied by troops. They lie about five miles east of the Sutlej and two miles south of the city. The cantonments are well laid out and fairly well shaded by trees. The water supply, of which more anon, is derived from wells, which average twenty-five to thirty feet in depth, according to the season of the year.

The garrison consists of: The Brigade Headquarter Staff; one Field Battery, Royal Artillery; one Medium Battery, Royal Artillery; one Indian Cavalry Regiment; one British Infantry Battalion; one Indian Infantry Battalion; one Indian Training Battalion; a very large Ordnance Department; the usual details, R.E., R.A.M.C., I.M.S., I.A.S.C.

The arsenal was started, in 1840, as an ordnance magazine, the rest of the ordnance buildings being in what is now known as the "Old Fort," which contains the I.A.S.C. supply stores, Government bakery and, in course of construction, a Motor Transport Company Depot.

In 1858 the arsenal was moved to its present site, about one and a half miles north-west of the main cantonment, a dry gun-cotton store, powder magazine and ammunition stores being added in that year.

In 1860 the gun-sheds and a large number of divisions of the arsenal were completed and the building of the fort round the arsenal was commenced.

In 1863 the Royal Artillery barracks were built, and in 1868 the married quarters.

During 1884-86 the fort was altered to its present form. As built in 1858 the inner quadrangle was much lower than at present and the outer hexagon a very "kachha" affair. The wall of the inner quadrangle has been considerably raised and the outer hexagon made much stronger. The moat and bastions were added during this period. The circumference of the outer wall of the fort is said to measure approximately three miles, and some idea of the amount of work carried out in the arsenal may be obtained by considering the fact that, including coolie labour, over 2,400 men are employed there.

There is a good Government dairy in the cantonment, which has a herd of about fifty to sixty head of imported and half-breed cows and a few buffaloes.

The Officers' Club is a very fine building, locally known as "Coates'

Folly," having been originally built by a trumpeter of the name of Coates, who was left a fortune but later became bankrupt. When I first saw the ball-room, in 1909, the original ceiling remained; this had been painted by Italian artists, imported by Coates; but now, owing to part of the roof having fallen in, the whole has been boarded over and whitewashed. The club building is now owned by Faridkot State.

The British Military Hospital and the Families Hospital are situated near the British Infantry lines; the hospitals, originally built as cavalry barracks, consist of three blocks, each of two stories. The buildings are on a par with those of other stations.

The re-introduction of the Brigade Laboratory or some such arrangement seems to be strongly indicated, so that work can be done locally instead of delay being caused by sending specimens to the District Laboratory; only very elementary work can be done in the clinical side, room which is poorly equipped. Referring to some old records, regarding work in connection with malaria, one finds the following :—

	Blood films examined	Mosquitoes caught and differentiated
1912	807	2,091
1913	1,639	1,608
1914	1,150	3,980
1915	1,553	2,169

The increase of local facilities for research would be advantageous to all concerned and any difficulties could be overcome by having a Command Laboratory from which confirmation of local results could be obtained or advice given if asked for.

The Indian Military Hospital has been entirely reorganized on a new site near the Indian Cavalry lines, is up to date and vastly superior in every way to the hospital for British troops.

There are a few memorials in various parts of the cantonment. Of these the oldest is St. Andrew's Church, commonly called the "Monumental Church"; this was erected in memory of those who fell throughout the Sutlej Campaign. The foundation stone was laid by the Archdeacon of Calcutta on St. Andrew's Day, 1847. The church was opened for divine service on September 19, 1852, and was consecrated by the Bishop of Madras on January 21, 1857.

The church was destroyed by fire, either by rebels from the Sadar Bazaar or by mutinous sepoys, on May 13, 1857, when, as has already been mentioned, the registers and communion plate were rescued by the Rev. R. B. Maltby at imminent risk of his life. On Christmas Day, 1858, the church was reopened for public worship. The rebuilding of the church included a thatched roof and kachha floor, without a tower; these were subsequently replaced and the church finally completed in 1869 or 1870.

On the way to the fort may be seen the Saraghari Memorial, a well-built domed building surrounded by a well-kept garden; this was erected prior to 1909 and I have not been able to obtain any information as to its

origin. It is generally believed that the memorial was erected in memory of the Sikhs who fell during the Sutlej Campaign.

In more recent years two more war memorials have been erected on the Mall, near the Royal Artillery and Indian Cavalry Messes. The following information concerning these was kindly given to me by one of the officers of the 10th Battalion, 14th Punjab Regiment:—

"The two memorials were unveiled, on December 3, 1923, by General Birdwood, as G.O.C.-in-C., Northern Command; the whole garrison paraded for the ceremony.

"The rectangular one, looking like the Cenotaph at home, is the memorial to the 20th Punjabis, now our 2nd Battalion; the other is to the old linked battalions, 19th, 22nd and 24th Punjabis, now our 1st, 3rd and 4th Battalions.

"Another memorial, shaped like a rifle cartridge, has been erected at Attock in memory of the 5th Battalion, formerly the 40th Pathans."

Those who served with the Indian Corps in France may possibly remember this gallant regiment and the unpleasant experiences of some of its members when entering Ypres, after the enemy gas attack in April, 1915.

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(*To be continued.*)

THE MILITARY MALARIA PROBLEM IN HONG KONG.

By Major F. HARRIS, M.C.,
Royal Army Medical Corps.

(*Continued from p.* 23.)

VI.—Anti-Malaria Measures Adopted in the Hong Kong Military Area.

(*a*) *Drainage.*

It is not disputed that drainage is the ideal anti-malaria measure, where it can be effectively carried out, but unfortunately in Hong Kong there are great difficulties in the way of its successful accomplishment, the greatest of which is money, or, to be more exact, the absence of money. For drainage to be effective it is necessary, in addition to draining the actual military-owned land, to obtain control over, and to drain, a protection zone round War Department land, having at a minimum a radius of 1,000 yards measured from the nearest barrack room or tent.

This, of course, in Hong Kong would necessitate a great expenditure of money, not only in respect of the drainage, which presents considerable engineering difficulty, but in respect of the purchasing of the ground forming the protection zone which in the case of camps is valuable padi. In the present state of financial stringency the drainage of the three camps is thus simply not practical politics, and so far has not been attempted.

At Lyemun the situation is somewhat different, and here a system of partial drainage is in force and is in process of being extended. The reason for this preferential treatment is that the Lyemun Barracks are, as already mentioned, occupied by a considerable body of troops throughout the year, who are thus exposed to infection during the most malarious months; whereas the occupation of the camps can be arranged during the less malarious season. Furthermore, at Lyemun War Department land has greater depth and, on two sides at least, a protection zone of military-owned land of 1,000 yards in width can be obtained.

A system of drainage has been in operation at Lyemun for several years prior to 1930, but had not proved satisfactory, the main defect being that the drains were superficial surface channels and did nothing to trap the underground water which, by coming to the surface in the form of seepage, was the cause of so many wet areas.

In 1930 it was agreed to expend a moderate sum of money on a new drainage system. At first it was hoped to be able to adopt the underground agricultural type of drain, but the rocky nature of the ground and its

geological formation, which consists in general of granite strata interrupted by frequent faults, were considered to make this method too difficult, and too expensive, and it was thought that the money available could be spent to better advantage upon other methods. Accordingly, it was decided to "train" the rocky nullahs nearest to the barracks and to build deep open drains, with concrete inverts plentifully supplied with weepholes, across the smaller valleys, in an attempt to intercept the water flowing between the granite strata. These two measures have been carried out during 1930 to the extent of $4,000, and have been successful in drying the ground in the areas so far dealt with.

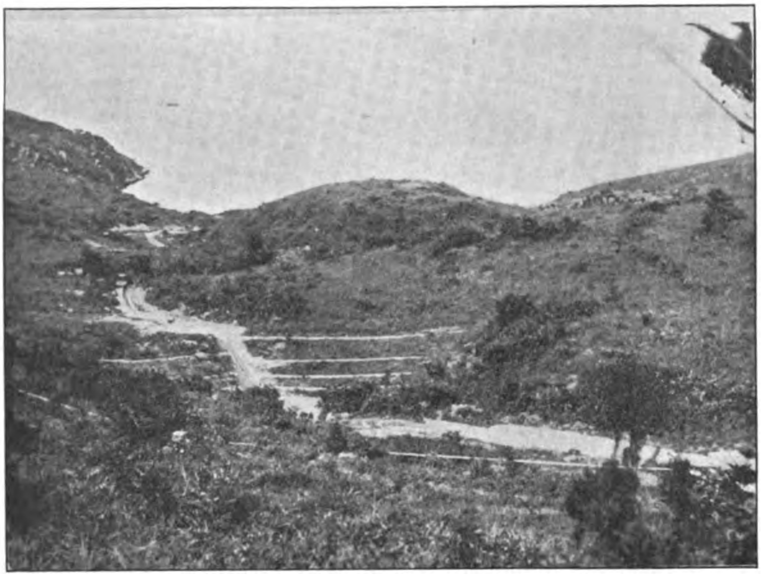

FIG. 3.—A valley at Lyemun with a "trained" stream flowing down the centre towards the sea, in the background. Once a haunt of *A. maculatus*, now dry.

It was only possible, with the funds available, to drain certain of the worst valleys, but further funds having been allotted in 1931, it is intended to extend the system, and it is hoped that, in the course of time, the whole of the military-owned land at Lyemun will be drained. Unfortunately, on the west and to a certain extent on the north, land not under military control approaches within a few hundred yards of the barracks. Since this land is entirely innocent of drainage, and appears likely to remain so, Lyemun can never hope to be wholly protected. Recently, however, permission has been obtained to carry out oiling of the streams in this ground, in certain limited areas, and it is hoped by this means that a degree of protection for this flank of Lyemun Barracks will be established.

It is too early yet to claim results from drainage combined with oiling at Lyemun. The drainage was not completed until December, 1930, and

the oiling was not in full swing until November of the same year, so results naturally were not apparent in 1930. For the period January to June, 1931 (date of writing), the incidence of malaria has shown a decline as compared with the same period in 1929 and 1930, but whether this reduction is due to the anti-mosquito measures carried out remains to be seen. The acid-test will come during the period August to November. Still, one can at least say that nothing has so far happened to point to the conclusion that the methods have not been successful.

FIG. 4.—One of the newly constructed drains at Lyemun. A good flow of water, and "weepholes" acting well. This drain curves to the left in a horseshoe manner, round the foot of the hill in the immediate background. It receives its water supply entirely through the "weepholes."

(*b*) *Oiling.*

Since drainage in the camps is impossible, and only possible at present to a limited extent at Lyemun, recourse has been had to extensive oiling. Three "Four Oakes" oil sprays were obtained from Singapore in October, 1930, and one was allotted to each camp. This type of spray, which is widely used in the rubber estates in the Federated Malay States, is carried on a coolie's back and is operated by a hand-pump attached to one side.

A hose, fitted with a double jet, emits a spray of oil some four feet wide, and distributes it evenly as the coolie walks along. In appearance and design the sprays are very similar to those used in Ireland for spraying potatoes with copper sulphate, and in France for spraying grape vines.

The oil used is a proprietary mixture specially marketed by the Asiatic Petroleum Company under the trade name of "Anti-malaria-mixture." It is a mixture of Diesel oil, solar oil and kerosene. Diesel oil being an unrefined oil is non-volatile at ordinary temperatures, and is added to the mixture with the object of giving it a lasting effect. Solar oil and kerosene are admixed to give the correct thickness. Moreover, it is claimed that these two oils being derived from highly aromatic crudes give the mixture a high percentage of those constituents which are poisonous to larvæ. The effect of the mixture, it is hoped, is twofold: first to prevent the larvæ breathing, and secondly, by entering their breathing spiracles, as they endeavour to push them through the oil-film, to poison them.

These sprays worked most successfully and appeared to be specially suitable for oiling narrow hill streams and irrigation channels. The only drawback experienced was that the oiling mixture had a destructive effect on the rubber hose, and after about a month's use the sprays were frequently out of action while the hoses were being repaired. Subsequently several spare hoses were obtained from Singapore.

A moderate amount of objection on the part of the coolies to work the sprays was experienced at first. The apparatus was new to them, and the Chinese coolie, being nothing if not conservative, shuddered at the idea of performing an unusual kind of labour. However, this difficulty was soon overcome, and when the coolies found that the work was actually much lighter than that which they normally have to perform to earn their daily bread, harmony reigned.

An anti-mosquito squad consisting of one other rank and two coolies was formed in each camp which, working under the general supervision of a R.A.M.C. corporal, was responsible for oiling all streams within a circle having a radius of 800 yards from the nearest tent once in eight days. To do this 300 gallons of oil per mensem for each camp were allowed. A length of stream having been trimmed and cleared of vegetation, a coolie walked along its bank, or actually in the bed of the stream, according to the nature of the terrain, spraying both the water and the vegetation at the edge. A thin even film of oil on the water results, and the best sign of efficient oiling is the blackening of the marginal vegetation as the oil permeates and kills the leaves. Even in running hill streams a film of oil persists in the pools and along the edges for several days, and can be detected as a play of colours on the surface of the water.

It was found that a Chinese coolie could spray from 3,000 to 4,000 yards of a hill stream in a day, depending on the nature of the ground and the strictness of his supervision. The initial clearing of vegetation, however, takes much longer.

In October a spray was obtained for Lyemun, and a monthly expenditure of 300 gallons of oil was authorized. An anti-mosquito squad similar to those in the camps was formed, and oiling was begun on all untrained streams within 800 yards of the barracks. The *raison d'être* of this oiling at Lyemun was twofold: first as an anti-mosquito measure in conjunction with the drainage in War Department land, pending the completion of a comprehensive drainage system, and secondly as a permanent anti-mosquito measure on all streams which lie outside the

FIG. 5.—The anti-mosquito squad at work at Lyemun.

War Department land but within 800 yards of barracks and which are most unlikely ever to be drained.

The results obtained during the camping season 1930-31 are looked on as being promising. This was the first time, so far as is known, that oiling had been carried out in a comprehensive and systematic scale in the Hong Kong area; and as will be seen from the figures in Table III, p. 22, the malaria incidence in the season 1930-31 at Sun Wai and Lo Wu was strikingly less than in 1928-29 or 1929-30. Similar figures are unobtainable for the camps for any season prior to 1928-29.

The incidence of malaria at Tai Lam in 1930-31 was, however, some-

what worse than in 1929-30. This fact is held to be of great importance for the following reasons: At this camp, owing to a variety of causes, it was not possible to begin oiling prior to the occupation of the camp, whereas, at the other two camps, oiling was begun a month before the troops were under canvas. Further, at Tai Lam it was impossible to oil one important hill stream which ran within a few yards of the camp boundary, and in which *A. maculatus* and *A. minimus* larvæ were constantly found, owing to the fact that it was from this stream that the drinking water supply for the camp, for both men and animals, was obtained. Incidentally, other arrangements for the supply of drinking water will be made before the camp is again opened. At the other two camps it was possible to oil all the important streams.

Thus the failure at Tai Lam, taken in conjunction with the success of Sun Wai and Lo Wu, is held to be an indication of the value of oiling, the line of argument being that Tai Lam, which was ineffectively oiled, acted in the nature of a control and tended to show that the marked decline in malaria in Sun Wai and Lo Wu was not due to some natural anti-malaria factor intrinsic to the season 1930-31. In actual fact, the winter of 1930 was exceptionally warm and summer-like, the temperature remaining high, and mosquitoes being unusually prevalent up to the New Year.

The fact that at Sun Wai and Lo Wu the padi and the slow-moving rivers were left unoiled with apparent immunity has already been mentioned. This result is in marked contrast to what happened at Tai Lam, where the small rocky stream was left untreated, and is considered as adding some evidence to the opinion held that *A. hyrcanus* is not of the first importance in Hong Kong as a carrier of malaria.

The fallacy of arguing *post hoc, ergo propter hoc* is recognized, and it is admittedly possible that the reduction of malaria at Sun Wai and Lo Wu in the season 1930-31 was due to some cause other than oiling and as yet unrecognized. It is also realized that the wish is often father to the thought. None the less, the opinion is held that at Hong Kong oiling, if carried out systematically and under strict supervision, is a valuable larvicidal measure. Its disadvantages, however, are threefold: firstly, it entails a great deal of supervision to be effective; secondly, it has to be carried out continuously; and thirdly, it is by no means cheap in operation. It has, however, the great advantage over drainage in these days of financial depression in that no large capital outlay is necessary. From this point of view it is particularly useful in areas which are only occupied for a few months of the year, such as training camps. It has to be remembered, however, that in such localities it is essential that work should be begun at least a month before these camps are occupied by troops.

It is not considered that oiling should be allowed to supplant drainage, where the latter is possible, in the neighbourhood of permanent barracks. As a temporary measure, however, pending the completion of such drainage, it is considered to be valuable. Whether these conclusions are correct or

not, it is at least encouraging that the incidence of malaria for 1930 was very much less than in 1928 and 1929, and definitely less than the mean of the years 1921 to 1927.

(c) *Nets.*

Second only to oiling as a measure of malaria prevention in Hong Kong comes screening of the individual by mosquito nets. This measure has long been adopted in all barracks in the area and in the camps.

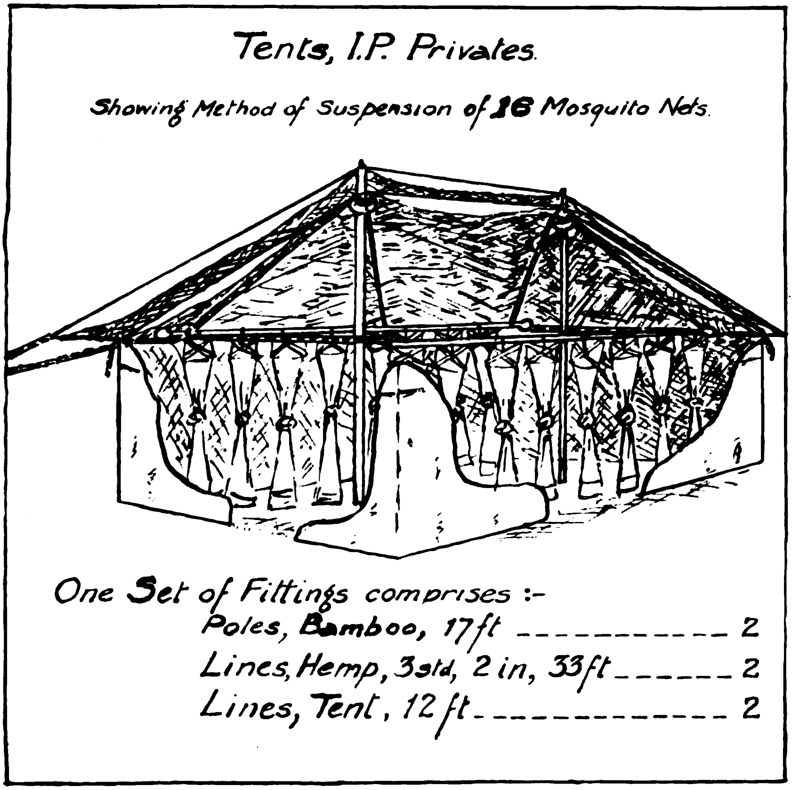

FIG. 6.—Sketch of nets in tents, Indian Pattern privates.

In the camps prior to 1929, however, nets were slung in bell tents and, owing to the difficulties inherent to this procedure, were of little, if any, use. In 1928 the late Colonel J. S. Bostock, C.B.E., suggested a method of slinging nets in an I.P. tent to Major W. White, R.A.O.C., who worked out the idea in detail. As a result an ingenious method was evolved whereby sixteen nets could be slung in an I.P. tent or six in a 160-pound tent, in such a way as to render their use effective. The main difficulty was that its adoption entailed the substitution of "tents, I.P. privates" and "tents, 160-pounds" for bell tents. This objection was eventually

overcome, and the exclusive use of I.P. and 160-pound tents, with the special mosquito fittings, is now universal throughout the China Command.

As is seen in the diagram, fig. 6, the principle is simple and consists in the case of tents, I.P. privates, of two parallel bamboo poles slung inside the tent, six feet from the floor and three feet from the tent walls. From each pole eight mosquito nets are hung. For slinging the poles two lines of two-inch hemp or manila cordage are used, each being thirty-three feet in length. A clove hitch, formed at the middle of each line, is taken round the turk's head on the tent pole, immediately below the inner fly. The ends of the line are then taken to the two nearest corners of the tent and are secured to the guy-ropes just above the wall. The 17-foot poles, whose ends are padded to prevent chafing of the tent fly, are supported by the two-inch ropes, on which they rest at their ends, being kept at the correct height and distance apart by means of two light 12-foot lines, one at each end, extending from pole to pole, and tied round the pole where it rests on the two-inch rope.

The tent, I.P. privates, being spacious and having four doorways, lends itself admirably to this method of using mosquito nets which, when arranged in two rows of eight, leaves ample space inside the tent for the storage of kits, for ventilation, and for movement.

The method adopted in the case of the 160-pound tent is somewhat different. This is a single-fly tent, supported by three jointed poles carrying a jointed ridge-pole. A 6-foot bamboo pole is secured to each standing pole by two 5-foot lengths of lashings, one above and one below the joint socket. A larger pole, not less than fifteen feet long, is laid along the tops of the 6-foot poles and lashed to each of the standing poles. Six mosquito curtains can be hung from the 15-foot pole. The object of the 6-foot poles is to reinforce the standing poles which would otherwise scarcely be able to bear the additional strain caused by the use of nets. With six nets slung in a 160-pound tent, space is somewhat cramped, and the method is not very suitable for British troops. It works very well, however, with Indians and Chinese, and it is by these troops that this tent is chiefly used.

These methods have now been in force during two camping seasons, not only in Hong Kong but in the Tientsin area, and have worked satisfactorily.

Bearing in mind that the native Chinese is the reservoir of infection, nets are also issued to all Chinese servants and followers who sleep in barracks and camps, and their use strictly enforced.

It can be said with some truth that were oiling absolutely effective, nets would be unnecessary. This is admitted, but it is unlikely in a country such as Hong Kong, with a climate so favourable for the development of mosquitoes and provided by nature with innumerable breeding places, that oiling or any single anti-mosquito method can hope to be 100 per cent successful. Certainly at present nets are looked upon as forming a valuable second line of defence against the onslaughts of the female anopheles.

(*d*) *Mosquito Repellants.*

Two repellants are in use in Hong Kong, bamber oil and "flit substitute"; the latter is also an insecticide.

Bamber oil is used by all sentries and picquets at the camps and at Lyemun, and is also used during all training operations where the troops have to pass the night in malarious country without nets.

"Flit substitute," as used in Hong Kong, consists of oil of wintergreen 1 per cent, paraffin 99 per cent (flash point 128° F., sp. gr. 0·82). It is believed that this insecticide was first introduced at Shanghai in 1927 by Major D. G. Cheyne, and was first adopted at Hong Kong in 1929. It is employed chiefly in the camps and at Lyemun for spraying the insides of tents, messes and institutes, and has been found to be very useful.

(*e*) *Screening Barracks by Wire Gauze.*

This method was considered in 1930 as being a possible solution to the malaria problem at Lyemun barracks. After a very brief consideration, however, it became apparent that the cost of its provision was prohibitive at present. Following on this decision the new drainage work was started at Lyemun, to be followed at a later date by oiling. Should these two measures not prove successful, screening would appear to be the only remaining solution, and the question of its provision would again have to be considered.

(*f*) *Prophylactic Quinine.*

As the stay of any one individual in camp is rarely more than five weeks, it was decided, prior to the camping season 1930-31, to give all ranks in the three camps ten grains of quinine sulphate each evening at 6 p.m., and to continue the treatment for ten days after their departure from the camps. It was felt that the danger period was between sundown and bed-time, when the soldier was unprotected by his net, and it was argued that if quinine were administered at 6 p.m. sufficient would remain circulating in his blood to protect him until he was safely under his net. It was realized that it is very doubtful if quinine has any effect on the sporozoite, but in view of the large number of cases of malaria that had occurred in the camps in 1928-29, and in 1929-30, and chiefly because the value of oiling was not then fully understood, it was considered that no stone, however small, should be left unturned.

It cannot be said that any beneficial effects were apparent. Tai Lam, where the quinine was religiously taken under the personal supervision of a R.A.M.C. officer, showed rather more cases of malaria than in the previous year, when no prophylactic quinine was used.

The only feature of interest noticed was that ten grains of quinine can be taken daily for a period of six weeks, with practically no opposition and without the least ill-effect, by men doing very hard physical work. It was anticipated that the Chinese servants would object to its administration,

but there was no refusal from them, their attitude apparently being that they were getting something for nothing, a state of affairs very unusual in China, and therefore too good to be missed.

It is not intended to continue prophylaxis during the camping season, 1931-32.

(g) Occupation of the Camps during the Least Malarious Season of the Year.

January and February being the least malarious months of the year form the ideal camping season, but unfortunately, from the point of view of training, this period is much too short. However, it has been agreed by the General Staff that the camps are not now to be occupied before the middle of November, nor after the end of March. As it is, the General Staff can only with much difficulty arrange their training programme between these dates.

In this connexion one cannot help being struck with the change in the mind of the non-medical officers of the Army in recent years; not so very long ago the conflicting claims of hygiene and military training would not have received such careful consideration and such just appreciation.

Early October appears to the newcomer to Hong Kong to present a perfect climate for camping. The rains are over, the sun is less vicious, humidity is low, and the country is green and beautiful. But, and it is a big but, the country is swarming with mosquitoes and malaria stalks the land.

An officer, during October, decided to spend a week-end at the Fanling Golf Club, situated within two miles of Sun Wai Camp, and probably the best golf links east of Suez. He afterwards told me that at dusk the mosquitoes descended upon him in clouds; many of them, he said, as big as hornets and all seemingly starving. Immediately after dinner he was forced to retire for protection beneath his net and, apparently, lay there cowering till dawn, when he packed his traps and returned to Victoria a much sadder and wiser subaltern. Allowing for a certain amount of picturesque exaggeration in his story, the main facts are true. Mosquitoes at this time of the year in the New Territories are a scourge. The sequel was interesting. On the tenth day after leaving Fanling the officer was admitted to hospital with malignant tertian malaria.

In peace time, the fact that the New Territories are a hot-bed of malaria from July to October is of small importance to the Army, but it gives one furiously to think what would happen should active service operations ever take place at that time of the year, particularly should the invader not be immune from malaria.

VII. Summary.

(1) Malaria has ravaged the Army in Hong Kong in the past.

(2) Malaria to-day is absent from the cities in the Colony of Hong Kong, but is still vital and dangerous, though masked, in the country districts.

(3) Hong Kong, from climatic and topographical reasons, is singularly well adapted to the development of mosquitoes and the propagation of malaria.

(4) The worst malaria months are August, September and October.

(5) The principal vectors of malaria in Hong Kong are *A. maculatus* and *A. minimus.*

(6) By far the most important reservoir of infection is the native Chinese population.

(7) By suitable anti-malaria measures the incidence of malaria among the military population can be kept within reasonable limits.

(8) The main difficulties are : lack of funds ; the nature of the terrain ; the absence of any anti-malaria work on civilian-owned land ; and military training necessities.

(9) The most important military anti-malaria measures at present available in order of value are: avoidance of camps before the middle of November; oiling; screening by nets ; drainage (not yet available to full extent) ; and repellants.

(10) The results obtained from the anti-malaria measures adopted in 1930 were not unpromising.

In conclusion, the thanks of the writer are due to Major-General P. H. Henderson, D.S.O., Director of Hygiene, the War Office, who suggested the subject matter of this article; to the Assistant Director of Medical Services, China Command, for permission to publish it and for his advice and helpful criticisms; to Major L. M. Rowlette, D.S.O., M.C., and Captain M. R. Burke, for so kindly providing the photographs; and, lastly, to Serjeant B. M. Tidd, R.A.M.C., statistical clerk in the office of the Assistant Director of Medical Services, China Command, who prepared the maps and the diagram, and who is responsible for the statistics on which the various tables are based.

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GREASE TRAPS.[1]

By Major H. S. BLACKMORE, O.B.E.,
Royal Army Medical Corps.

Attention was directed to the question of grease traps by the realization forced upon one by teaching, that considerable confusion and very little definite knowledge seemed to surround the subject.

It was early evident that there were two completely different principles involved :—

(*a*) The extraction from water of that form of grease which was solid when cold. (*b*) The extraction of the grease which remained liquid whatever the temperature of the water (except of course below 0° Centigrade).

A very little further consideration brought home the fact that most, if not all, the known types of traps were intended to deal, in the case of (*a*) with a precipitate designed to form in the trap itself, and in the case of (*b*) with a preformed precipitate.

In many cases the fundamental differences between (*a*) and (*b*) did not seem to have been recognized.

From this point our investigation divided itself definitely into two unrelated halves. In Part I we have tried to study the problems connected with the reduction of temperature in the trap to below that of the melting point of those greases met with in ordinary military life which are amenable to this treatment. In Part II we have endeavoured to throw some light on the difficulties which are encountered in efforts to render water grease-free with the help of a chemical precipitating agent.

Both parts have presented their particular stumbling-blocks and in most cases the obstacles to one hundred per cent success have not been completely surmounted.

Part I.—Some of the Problems Connected with the Elimination of Grease by Reduction of Temperature within the Trap to below a Definite Point.

This part of the work was based upon the fact that most, if not all, the greases we are considering are solid below 25° C. This temperature was looked upon for the purposes of this investigation as a sort of critical temperature. We aimed at keeping the temperature of the water in the so-called "cold-water grease trap" below this empirical danger line.

Throughout the investigation a trap constructed of tin having a total

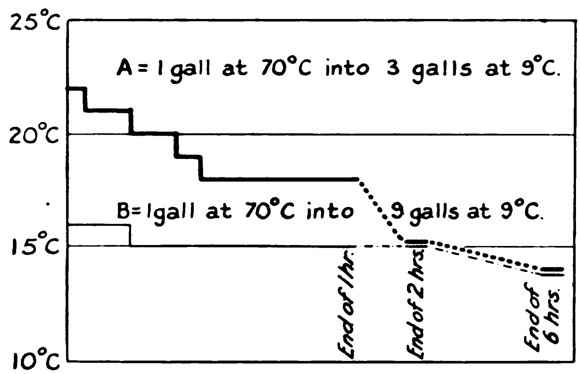
[1] Extract from the Quarterly Report, Army School of Hygiene, dealing with "Grease Traps."

capacity of nine litres has been used. Both material and size are held to be of negligible intrinsic importance, but the size is of the utmost importance in relation to the demands made on the trap.

A great number of observations have been made, but there would seem to be no object in burdening this report with any but the essential details. Certain facts of major importance have emerged. Thus :—

(i) The result of mixing various quantities at varying actual and relative temperatures follows fairly closely the theoretical forecast.

(ii) The combined effect of radiation, conduction and convection on the result is negligible—within a time limit of several hours under the conditions of experiment. See graph below. This is *most* important.



Graph showing initial and subsequent temperatures taken at five-minute intervals for one hour, with a final reading at two hours and six hours. Air temperature 10° C., water temperature 9° C.

(iii) The result of (ii) above is that the temperature of the water in the trap will steadily rise until it reaches, and passes, the accepted danger line of 25° C. (Unless the trap be quite fantastically large compared with the amount it is to deal with.)

(iv) This rise is steady, rapid and continuous in the ratios tried out. (See Charts Y and Z.)

(v) The average temperature at which sullage water reaches the grease trap is in the neighbourhood of 40° C.; this is the average of some twenty readings.

(vi) When the temperature does reach the danger point grease can be detected on the distal side of the baffle-plate concerned almost immediately.

(vii) The statement in (vi) holds good at very slow rates of flow—such as an eighteen-minute flow, i.e., where it takes eighteen minutes to fill the trap.

It must be emphasized that throughout this work one hundred per cent efficiency of the traps has been aimed at. Unless this is attained, it is merely a question of how long the adjacent soakage area is able to last . . . presuming that the trap is used in conformity with this principle of disposal.

Relative efficiency of a very high order is comparatively easy to attain, but we have definitely failed to reach our goal of one hundred per cent when using any ratio between trap and flow which was of a practical order.

CHART Y.

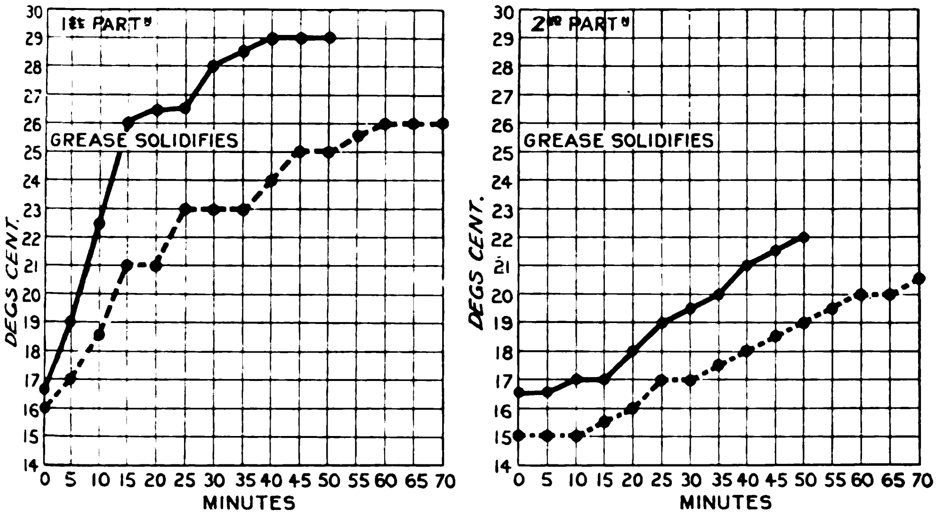
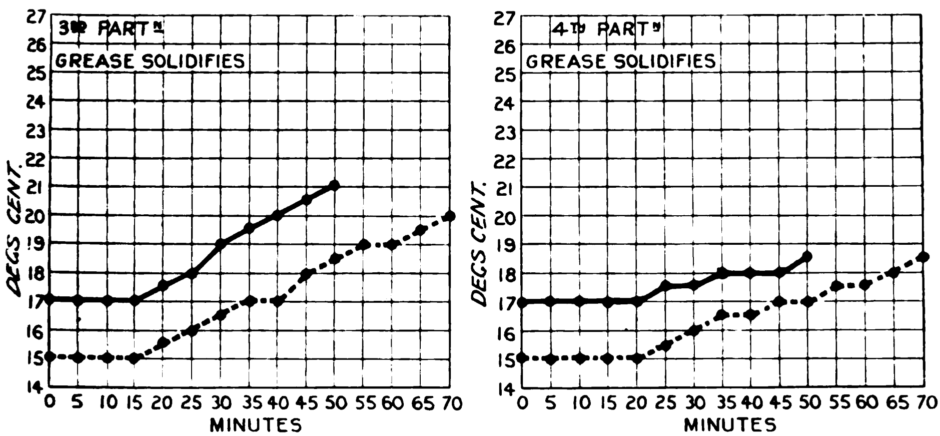


CHART Z.



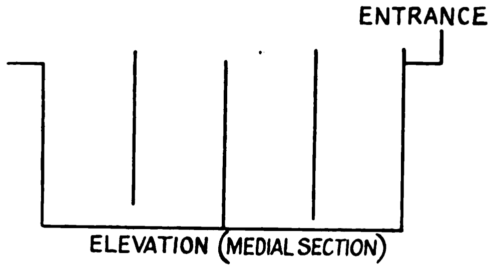
Comparing results of experiments—(1) 9 litre tank or grease trap, ($\frac{1}{36}$) $\frac{1}{4}$ litre at 40° C. added every five minutes, shown by solid line. (2) 9 litre tank or grease trap, ($\frac{1}{50}$) 180 c.c. at 40° C. added every five minutes, shown by broken line.

The experiment leads to the conclusion that the principle of the "cold-water grease trap" has not, so far, yielded full efficiency.

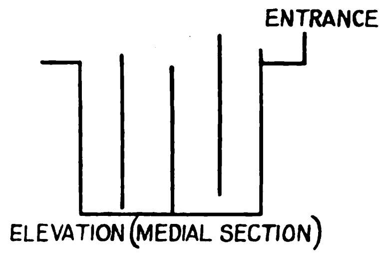
It is an attractive but deceptive method.

The object in view (full efficiency) is of such practical importance that the subject merits more critical study.

In studying the effect of speed of flow over unit area, traps of the designs shown in the diagrams were used.



TRAP 1.



TRAP 2.

PART II.—SOME INVESTIGATION OF QUESTIONS RELATED TO THE ABSTRACTION OF A PREFORMED PRECIPITATE FROM GREASY WATER.

For this work we again used traps made of tin, of a uniform capacity of 9 litres. As before, we consider the choice of material and capacity to be immaterial, except in so far as size is related to demand.

Attention is invited at this point to the fact that in Part I we were dealing with problems whose base rested upon questions of temperature, " current effects " were a vital but secondary factor. But in Part II we are to find that " current effects " are not only a vital but a primary factor.

It must be again emphasized that our avowed goal is one hundred per cent efficiency; and for the same reasons.

Recognizing the supreme importance of currents, but failing to grasp the concurrent development of yet another factor to be described later, we first concentrated on the design of the trap.

We adhered to both the material and capacity already used, as by such standardization we were able to utilize certain common observations for either, or both, branches of our work.

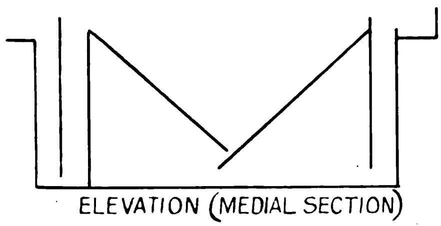
We adopted another empirical standard: we made our soap solution at 0·3 per cent by weight; this figure was an approximation to the amount of soap actually used per wash, on the average, by one of us, tested over three days.

After quite considerable preliminary work we decided to use bleaching powder as our precipitating agent, although we found slaked lime quite as efficient. The strength decided upon was 0·1 per cent, and a " standard stir " equals a triple agitation of a litre in a litre cylinder with a standard four-bladed stirrer.

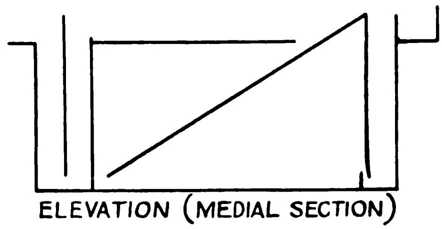
It is of considerable importance to mention that we got no practical results with any alum salt. The clarification was perfect, but the effect was far too slow in developing.

At the very beginning of our work we began to appreciate the fact that the specific gravity of our precipitate varied through wide limits, some of it being so heavy as to sink on the least provocation, other portions of it so light as to collect on the surface of the first compartment of our trap on the proximal side of the first baffle. But there was a third portion, small but definite, and always present, the specific gravity of which was so close to that of water, as to place it completely at the mercy of any current. Moreover, this held good for a current speed as low as that induced by a 100-minute flow, i.e., a flow of such a speed as to fill the receptacle in 100 minutes.

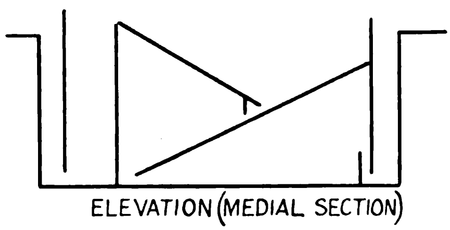
By watching the direction of the currents, as indicated by the movement of the precipitate, we conceived the various modifications of our trap shown in the accompanying diagrams. Each was intended to impart a swirling motion to the water. It was hoped in this way to provide opportunity for the slightly higher specific gravity of the precipitate to exert its influence; and for the precipitate to sink and be caught by the baffle plates.



TRAP 3.



TRAP 4.



TRAP 5.

In each modification we found ourselves a step nearer our goal, but we never reached it. We were defeated by a secondary factor, which was only recognized quite late in the day.

This factor might be called the "saltatory" factor, because on any increase of speed other than a purely nominal one, the whole bulk of the water in the trap gives a jump or heave forwards. This leap carries with it the swirling particles and thus defeats the object of the rotating current by throwing these particles out of its sphere, and eventually carries them past the baffle plates. Thus the principle on which we have built so much, and for so long, proved to be a broken reed.

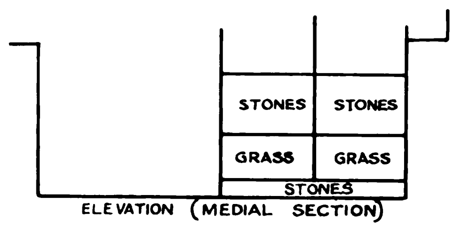
We next turned our attention to the principle of filtration. To what extent could we utilize this? Entirely, or almost entirely, useless as a

method of abstracting the grease liquid in hot water but solid below 25° C. dealt with in Part I ; could it help us here?

First we tried sand. This was useless. The area required to obtain any flow which was even approaching an adequate speed took our trap at once into the realms of nightmare or Heath Robinson.

Then we bethought ourselves of grass under pressure. This was a great success. It did not give us our ultimate object of one hundred per cent efficiency, but it gave us a nearer and nearer approximation to this as modifications were introduced.

With the first trap tested (6) the precipitate fell direct upon the stones of the upper layer. This resulted, very soon, in too great interference and consequent damming back of the stream and overflowing of the first compartment.



Trap 6.

This led to the recognition of the fact that the primary filtering layer, which takes the brunt of the attack, must be easily removable for cleaning.

A layer of grass above the first layer of stones was added to the first compartment. This change met the above mentioned trouble, but the trap was not too efficient and was a long way off one hundred per cent.

When this trap was carefully stripped, it was found that a proportion of the precipitate, sufficient for recognition, had penetrated as far as the middle of the second grass layer, in spite of the fact that not much had been put through the trap.

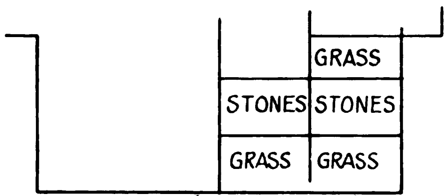
It was then decided to regard the stones as weight and not as a filtering medium, which is part of their function in a soakage pit, of course. The idea was to compress the grass stems so as to form a close mesh and a more selective filter by the weight of the stones.

Trap 7 was therefore made up and was used for the final long run of 45 litres of precipitate, plus 1,320 litres of continuous water flow, spread over a time period of some fifteen hours.

Moreover, *this type of trap is* NOT *so sensitive to changes in speed.* It was even possible to run it at a three-minute flow without materially increasing the amount of the precipitate passing it. This was a great deal better than anything we had tried so far. On the strength of it we went on to test the precipitate which did pass.

In this phase of our work we set ourselves to find out how much damage could be done by the fine and sparse precipitate we were failing to stop.

The apparatus used was a medium-sized Buchner funnel, plus glass wool. This represented the actual soakage area of a soakage pit. The area was arranged to be one-twelfth of a square foot. A total of 1,320 litres (some 293 gallons) of water was passed through at the rate of a litre a minute (nine-minute flow). In addition, 45 litres of precipitated soap solution (0·3 per cent soap plus 0·1 per cent bleach and one "standard stir") were added to the trap at intervals of a litre every half hour, and at the same speed of a litre a minute.



ELEVATION (MEDIAL SECTION)

TRAP 7.

At the end of this period there was definite evidence of damming back in the Buchner funnel. This proved that our soakage area had a definitely lessened soakage capacity.

We now have sufficient data to attempt a translation of our experimental results into terms of practical happenings. We have used a model grease trap of nine-litres (two gallons) capacity. Speeds through the trap varied from a hundred-minute to a three-minute flow; the soakage area was one-twelfth of a square foot.

For comparison, let us take as a standard a 50-gallon capacity grease trap of the same type, a three-minute flow as representing the maximum call likely to be made upon our system (i.e., 50 gallons in three minutes equals 1,000 gallons per hour, or 500 men using 2 gallons per head within a given sixty minutes of time), and two 4-foot cube soakage pits.

COMPARISON OF THE TWO SYSTEMS.

	Capacity of trap in gallons	Delivery per min. in gallons	Soakage area available sq. feet	Soakage call in galls. per sq. ft. per min.
Experimental trap system ..	2 ..	$\frac{2}{3}$ ..	$\frac{1}{12}$ x ..	$\frac{1}{8}$
Standard 50 gall. trap system..	50 ..	16·6 ..	160 y ..	$\frac{1}{10}$

Note x—This is the surface area of the glass wool in the Buchner funnel.
Note y—This is the surface area provided by two four-foot cube soakage pits.

It is therefore reasonable to claim a sufficient relation between the two systems. This would seem to imply that the mere specks of precipitate which Trap 7 allows to pass are enough to produce definite clogging effects on either soakage area in something like twenty hours of continuous running.

In practice this would be spread over seven days or so, and, furthermore, there are other factors at work which assist filtration. In the first place, the actual soakage pit is filled with stones which act as a quite considerable filtering agent. Next, the actual weight of the water which the pit will hold helps the soakage. Lastly, there is the factor of intermittence, which will have some slight influence.

On the whole, then, the balance is in favour of the standard as against the experimental. All the same, the fact remains that we have not reached our goal of a hundred per cent efficiency trap, and the portion we let pass, small though it is, will slowly but surely clog the pores of our soakage pit.

On dissecting Trap 7, at the end of the long run, it was found that the precipitate had penetrated to the bottom of the first compartment. This was considered quite a satisfactory result. It is true that the first wad of grass had been renewed several times, because the head in this compartment had begun to rise, but this is an easy and simple operation.

The weight and size of the pebbles in our experimental trap would be represented in a standard fifty-gallon trap by stones of about the size of ordinary bricks.

On dissecting the glass wool in the Buchner funnel, an operation which had to be carried out with the aid of a plus-ten pocket lens because the spots of the precipitate were so small and so nearly of a colour to that of the glass wool, it was found that precipitate had hardly penetrated at all, lying almost on the surface of the glass wool.

THE COMPLETE MILITARY SURGEON.[1]

By Lieutenant-Colonel E. M. COWELL, D.S.O., D.L.,
Royal Army Medical Corps, Territorial Army.

Introduction.

May I express to the Council and members of the United Services Section my keen appreciation of the honour bestowed not only on me personally, but on the branch of the Service to which I happen to belong. During my term of office I will do all that lies within my power to enhance the reputation and usefulness of this popular and active Section of the Royal Society of Medicine.

Reference to the published presidential addresses of my illustrious predecessors has rather stimulated than disheartened me. The subjects chosen have ranged from discussions of general policy to detailed descriptions of hospital ships in peace and war.

To-day, I propose to give a brief survey of the glorious history of Military Surgery throughout the ages. The youngest officer will do well to inquire into the magnificent traditions he has set himself to follow. The complete Military Surgeon should be almost a superman. He should strive to reach the highest physical and moral development. In order to look after the welfare of sick or wounded he must be the fittest man in the hospital or unit to which he is attached. In addition to acquiring high professional knowledge, he must train himself in all branches of the Military Art, making himself a Soldier as well as a Doctor. He must study organization and administration, not resting content until he has reached the standard set by the Staff Colleges. Methods of transport with a full knowledge of technical details may be vital in a given situation. On the technical side there is ample scope for the keenest study as specialists are required in surgery, medicine, pathology and so on.

The complete Military Surgeon, too, must be a man capable of instant decision, possessing sound judgment and having those rare qualities of tact and diplomacy, combined with tireless enthusiasm, so essential for successful organization, whether of small units or of large commands.

Paracelsus laid down, at the end of the fifteenth century, that "knowledge was to be advanced by experimentation controlled by an authoritative literature."

The literature available for the study of the history of military surgery is so vast that it is impossible in these busy days to do more than take an occasional glimpse at some writing of outstanding interest.

However, several small books exist, such as Colonel Garrison's "Notes," which open the subject to even the busiest officer.

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[1] Presidential Address, United Services Section, Royal Society of Medicine, 1931 to 1932.

From the dawn of the world's Medical and Surgical History, War has always been a prominent factor in the development of medical and surgical knowledge. In ancient Egypt the origin of medicine was attributed to Sekhet, the Goddess of War.

In the times of the oldest Egyptian dynasties, the medical profession was organized and the sick on campaigns were treated without cost to themselves.

In ancient India, the Susrata written in the fourth century B.C. describes in detail "the mode of preserving the life of the King, whose soldiers are on the march."

"The Medical Officer, fully equipped, was to be stationed near the Royal Pavilion, easily accessible by all."

These writings hold the surgeon in great esteem.

"Surgery is the first and highest division of the healing art, least liable to fallacy, pure in itself, perpetual in its applicability, the worthy produce of heaven and the sure source of fame on earth."

In ancient Greece the surgeon was not held in such good repute. Two famous Trojan soldiers, Machaon and Podalarius, are spoken of by Homer. Arctinus, writing on these two sons of Æsculapius, says: "The Father bestowed the power of healing on his two sons. Nevertheless, he made one of the two more celebrated than the other; on one did he bestow the lighter hand that he might draw missiles from the flesh, and sew up and heal all wounds; but the other he endowed with great precision of mind, so as to understand what cannot be seen, and to heal seemingly incurable diseases."

Machaon, a popular medical officer, always rode in the General's chariot, "for a Doctor is worth many men."

It is stated that the word physician meant originally in the old Ionian dialect, "Extractor of Arrows."

Achilles the Warrior apparently practised, too, as a military surgeon.

Hippocrates advised that those who would become surgeons "should join an army and follow it."

In Sparta, by the law of Lycurgus, Army surgeons were to retire in battle to the rear of the right wing.

At the time of Xenophon, his eight surgeons shared tents with the nobles, soothsayers and flute players.

Dr. Fröhlich, the eminent historian, concludes: "Homer was nothing less than an Army surgeon."

About 450 B.C. Diocles invented his graphiscus, a spoon for extracting embedded weapons. This was later much used in the Roman army. Military surgery flourished in the Roman Empire. Livy states that, at the Battle of Sutrium, 309 B.C., more soldiers died of wounds than were killed in action. In peace time temples for the cure of sick were dedicated to the goddesses Febris and Scabies.

Early records and monuments show that Roman soldiers were bandaged

after being wounded. It is on record that in 469 B.C. the troops under an unpopular leader, Appius Claudius, were found with self-inflicted wounds. About this time, too, is described the evacuation of the wounded to avoid demoralization of the fighting line.

In 204 B.C. it is reported that Scipio Africanus cleared his wounded during a lull in battle. There are many quotations which show that the Roman army commanders took an interest in looking after their wounded.

Julius Cæsar bestowed the rights of citizenship on his doctors, and his subordinate field commander, Labienus, evacuated wounded in wagons in 46 B.C., after the battle of Ruspina.

In the reign of Tiberius Cæsar, A.D. 14-37, Celsus wrote on military surgery and described the extraction of weapons from the body. Later, Galen, A.D. 131-201, showed his interest in military surgery by his treatise on "Malingering or Feigned Disease."

The Emperor Augustus, in his Constitutions, bestowed on free physicians the equestrian dignity. Is this the reason why medical officers to-day still wear spurs?

Many inscriptions to Roman medical officers still exist, and the Volunteer and Auxiliary Cohorts had a separate medical personnel.

A few epitaphs of Roman naval surgeons have been found. It is on record that the surgeons to the triremes "Cupid," "Tiger" and "Faith," were termed "duplicarii," i.e., men who drew double pay. This was not an index of the high professional merit of these gentlemen but was necessary, since Romans hated the sea and required special inducements to enter the Naval Medical Service. The surgeon, Tollius Valens, unfortunately died soon after his appointment to the "Faith."

With regard to the clothing worn at this time, the details of the uniform of an Army surgeon at the time of Trajan is known. The riding breeches reaching to the calves, short sword and belt, have survived to the present day.

In the Byzantine Empire, A.D. 590, the Emperor Maurice in his "Tactics" mentions mounted bearers. Eight to ten stout fellows, with a double stirrup on the left side, were to ride behind the troop and pick up wounded. These men were to receive a gold piece for each wounded man removed. Male nurses, too, are mentioned.

Roman Military Hospitals have been excavated at Vienna, Bonn and Swiss Baden. In the camps constructed in savage warfare, the sick quarters, "Valetudinarium," were placed near the Quartermaster's store, "Quaestorium," and behind the Orderly Room, "Praetorium." The blacksmith's shop was far removed so as not to disturb the sick.

In the Eastern Roman Empire (A.D. 395-1453) Army organization reached a high level of development. Divisions, Brigades, Supply Depots and a Medical Corps were established.

About A.D. 800 the Emperor Leo wrote to the G.O.C.: "Give all the

care you possibly can to your wounded. If you neglect them, you will make your soldiers timorous and cowardly before a battle, not only that—your personnel will be otherwise lost to you, through your own negligence."

At the end of the seventh century that great surgeon, Paul of Ægina, describes wounds of the brain, lung and heart, pointing out that suppuration is not necessarily fatal. He also recommended tracheotomy, trephining and ligature for wounds of the arteries.

During this time the Mahommedan Armies were producing some famous surgeons. Rhazes (860-932) wrote a chapter on military surgery and fully described camp sanitation and the need for isolating cases of infectious disease.

Albucasis described thoracic wounds.

In Feudal times in Europe, nothing was done for the common soldier. Surgical practice was interdicted by the Church. "Ecclesia abhorret a sanguine."

The eight Crusades, 1096-1272, did not contribute to any extent to the advancement of military medical science, and there is no history of medical arrangements made on the battle-field.

In the first Crusade, Baldwin received a spear wound in the thigh and was carried off in a litter, suspended between two horses.

In the fifth Crusade, scurvy made its appearance and was treated by Jacques de Vitry.

The Knights of St. John were established July 15, 1099, and settled themselves in their hospital in Jerusalem.

In the Hundred Years War, 1337-1410, the chronicles of Froissart state the wounded were conveyed to a neighbouring house and suitable dressings applied.

Credit is due to England for making the first attempt at an organized Medical Service in the Middle Ages (Withington).

When Prince Edward was stabbed in Palestine, it is very doubtful whether the wound was sucked by his wife; but there is good evidence that it was excised by an English surgeon. In his invasion of Scotland (1299-1301) he was accompanied by seven medical men.

It is on record that Henry V at Agincourt was attended by Nicholas Colnet as physician and Thomas Morstede, surgeon. These were followed by three mounted archers and assisted by twelve members of their own craft.

In Spain, doctors accompanied the armies in the field; and in 1484, the Queen Isabella, at the siege of Alora, established six large hospital tents, "The Queen's Hospital." Later, wagons with beds were provided, and in 1487 it is recorded that at the surrender of Malaga the Queen's hospital followed in 400 wagons.

At this time the formation of standing armies became common, and consequently the medical personnel increased.

At the end of the thirteenth century, Charles the Bold of Burgundy

supplied one surgeon to every 800 men. The rate of pay was twelve crowns a month for Lancers, five for Physicians.

In 1500 Sully, in France, established Military Hospitals with an Ambulance Service for First Aid. In 1555 Charles V of Germany sent his sick and wounded by baggage trains into tents (the Hospitals of his Grandmother Isabella).

In the Spanish Armada, 1588, there is mention of a Hospital Ship.

Ambroise Paré, 1510-1590, was a great surgeon whose name will never be forgotten. He learnt his surgery on the field of battle, and throughout a long and arduous career was almost always occupied on some military campaign. His work is so well known that it need not be mentioned further here. *Paracelsus*, 1493-1541, who immediately preceded Paré, was a pioneer in the art of rational surgery. In 1536 he wrote his "Larger Wound Surgery" and declaimed against the prevalent practice of maltreating wounds with foul concoctions. His words are worth remembering: "Nature has her own Doctors in every limb; wherefore every surgeon should know that it is not he, but Nature that heals." "What do wounds need? Nothing," and he goes on to say, "Flesh heals from within outwards, all that is necessary is to protect them from the elementary powers hostile to nature."

Vesalius is another Star, adding lustre to the list of famous military surgeons living at this period. He was a surgeon in the army of Charles V, and will be remembered as the founder of modern anatomy.

In the time of Queen Elizabeth, in England, the Corporation of Surgeons acted as Directors General of both Naval and Army Medical Services.

In 1633 Stephen Bradwell wrote on First Aid.

Mathaeus Purmann, 1649-1671, was a great surgeon and brilliant operator. Serving in the Brandenburg Army under the great Elector, he operated successfully on the lung, sutured intestines, did forty cases of trephining and complained of the difficulty of extracting splinters made by hand grenades.

Murel, 1674, introduced the tourniquet and successfully ligatured the femoral artery at the Hôtel Dieu in 1688.

General Martinet in France introduced regularly planned camps in 1667, the bayonet in 1669, and also inaugurated the "Word of Command."

Gustavus Adolphus made reforms in military science at this time in the seventeenth century. He introduced Battalions, substituted muskets for pikes and was the first to uniform his regiments completely. The uniform designed for his army surgeons became the costume of the practising physician of the eighteenth century.

In France Cardinal Richelieu made many medical innovations. He established the first Stationary Hospitals in the rear of Armies in the Field. In 1626 he improved the service of Field Hospitals, and in 1633 founded La Maison des Invalides.

In the seventeenth century in England several famous men were serving as military surgeons. Thomas Willis, William Harvey, Richard Wiseman (surgeons to the Royalist Army) and Monro the anatomist.

Richard Wiseman first employed primary amputation in gunshot wounds of the joints, and in 1679 James Yonge records the first case of flap amputation.

We now come to the eighteenth century, which Carlyle characterized as "*Spend-thrift, fraudulent, somnambulistic* and *bankrupt*." "*Men's Souls are extinct. Stomachs well alive.*" This was an age of quieter periods, shorter wars. The solemn, lengthy, cadaverous faces of the seventeenth century gave way to the ruddy, heavy-jowled, eupeptic personalities of the three-bottle men. A set order of things prevailed.

In the War of the Spanish Succession, 1703-1713, the Great Duke of Marlborough took immense interest in the health of his men.

In his march to Blenheim he covered 1,176 miles in eighty-one days. This was due chiefly to the institution of rhythmic marching. Before the Battle of Blenheim he organized the Aid Posts.

Louis XIV in France laid down a revised medical establishment and founded fifty-one military hospitals in the country.

Frederick the Great, in his Silesian campaigns, 1740-1745, depended on rapidity of movement and vigorous offensives. He was the most active of all great soldiers in forwarding medical administration, making his own medical dispositions. Cothenius, at his instigation, organized his Stationary Field Hospitals and Dressing Stations, "sheltered from enemy fire by a convenient hillock or in a ditch."

As regards our own Medical Service, Sir John Pringle, 1707-1782, was the great Surgeon General of the English Army. His writings are classical. He anticipated the Geneva Convention by arranging a temporary Red Cross agreement for the collection of wounded during a lull in battle.

In this century the names of the following military surgeons may be mentioned: In France, Petit (screw tourniquet), Littré, Chopart. In England, Percival Pott and John Hunter. In Germany, Heister (ligature of vessels isolated by forceps) and Richter.

In 1786 John Hunter became the Deputy Surgeon General of the British Army and Surgeon General in 1791. In spite of his surgical brilliance he was an indifferent administrator. He was described by Robert Jackson as "A man of an original mind, but too little acquainted with military operations in the Field, to foresee everything that was likely to occur in Military service."

Sir James McGrigor (1771-1858) at the assault at Badajoz, was the first to suggest gazetting medical officers for bravery in action. He reduced the sick-rate by his administrative measures and founded the museum at Fort Pitt, afterwards removed to Netley. This officer inaugurated "Statistical Returns."

Inspector-General Barry.—It is not generally known that a most

distinguished officer, serving in the Peninsular War under Sir James McGrigor, Inspector-General Barry, was found at death to be a lady.

A famous Scot, Robert Jackson, 1750-1829, should be remembered for saying, "Handling a knife is the least part of a Regimental Surgeon's duty."

That fascinating figure, Dominique Jean Larry (1766-1842), can only be briefly mentioned here. Thrice wounded, taking part in sixty battles and 400 minor engagements, this gallant officer of Napoleon Bonaparte devoted his whole career to military surgery and to the welfare of the wounded soldier. He became Professor at the Val de Grâce and founded a school of military surgery wherever he went. He was a brilliant surgeon, fearless officer and wonderful organizer. His "Ambulances Volantes" will always be remembered.

In the nineteenth century there were many names of men of outstanding merit as military surgeons:—

Sir Charles Bell, at Corunna and Waterloo.

Dupuytren, in 1830. Esmarch and Stromeyer in 1849-1851.

Pirogoff took up the administration of ether in the Crimea.

In the Franco-Prussian War, Bilroth, Langenbeck, Volkmann, Wilms Czerny and Nussbaum deserve mention.

This rapid survey of the history of Military Surgery would not be complete without some reference to the history of Military Nursing. Asclæpius (Æsculapius of the Romans) was the son of the Sun God, Apollo. One of his daughters was Hygeia, the first Nurse. We know from Homer's "Iliad" that women rendered medical aid to the wounded heroes.

No organized women's service, however, existed for nursing in the field till comparatively recent times.

The Order of the Béguines of Flanders was founded for this purpose at Liége in the twelfth century and spread widely in Europe. After six hundred years the Order was still extant and gave its whole strength to the service of the armies in Europe in an epidemic of fevers. In the Thirty Years War, the Order of the Sisters of Charity was inaugurated by St. Vincent de Paul. These women were employed in war nursing, being called in 1654 to Sedan and in 1656 to Arras.

St. Vincent addressed the Sisters as follows: "Oh! Sisters, men go to war to kill one another, and you to repair the evils which they have done. You go to restore life, or at least by your care to assist in preserving it."

Napoleon made much of these Sisters, and in 1815 decorated Sister Martha.

At the end of the eighteenth century an awakening occurred in Germany with regard to the importance of nursing. Nursing was for the first time regarded as a means of cure and as important as drugs. Up to this time the few nursing books in existence were behind the Greek ideas, written

two thousand years previously. Windows were not to be opened and washing in bed was unknown.

The Napoleonic wars supplied the stimulus to the women of Germany. In 1836 the Nursing Society was founded in Berlin, and Amalie Sieveking founded "The Friends of the Poor" with Pastor Fliedner. This gentleman started his system of training, which inspired Florence Nightingale.

The magnificent work of this lady cannot be mentioned too often. In the face of enormous opposition, even from some of the medical officers of high standing, not only did she succeed in improving the conditions in the vast hospitals in the Crimea, but she did a great deal for the general welfare of the troops. She established reading rooms, canteens, &c., and encouraged thrift and saving.

On her return to England she sought to find means to improve the health of the Army. On being summoned to Balmoral, she asked for a Royal Commission to inquire into the Army Medical Department, barracks and hospitals. Netley was being built and Florence Nightingale fought for the Pavilion system. The Queen Alexandra Military Hospital is due to her efforts. According to Sir George Evatt, she was "the greatest sanitary reformer the world has ever produced."

THE CONTROL OF INFLUENZA IN A COMMUNITY: A CRITICISM AND REVIEW.[1]

By Major A. L. STEVENSON,
Royal Army Medical Corps.

An article on "Saliva-borne Disease Control: Eradication," by Cumming was reprinted in the February number of the Journal of the Royal Army Medical Corps, 1931.

The points he emphasized are the following :—

Four epidemiological factors determine infectious disease prevalence, viz.: (1) transmission rate; (2) healthy carrier rate; (3) susceptibility rate; (4) degree of contact.

It is difficult to identify all carriers; impossible to segregate all susceptibles, and impracticable to avoid contact. Therefore transmission is the key factor. Transmission rate when under control counterbalances the unfavourable influences of the other three. The susceptibility rate is a minor factor, only important when the avenue of spread is wide open. Unusual crowding only facilitates transmission when routes of distribution are not blocked.

In the World War the greatest facility existed for transmitting saliva-borne diseases. In our ignorance we tried to limit control by blocking air-borne (direct) contact transmission, a minor avenue only, while the major avenues (indirect contact, e.g., contaminated hands and contaminated eating utensils —→ mouth)—which led to eighty per cent of the cases—were unrecognized and uncontrolled.

His investigations of the messing and washing-up arrangements among a large number of both civilians and soldiers during the Great War enabled him to conclude that the distribution of influenza by contaminated eating utensils is responsible for the majority—eighty per cent—of the transmissions, and, in addition, more extended transmission occurs through the distribution of hand contamination (inanimate objects commonly handled). In mechanical or hand-washing methods with boiling water, the major avenue (indirect transmission) of distributing saliva-borne infections is closed.

Major Thompson's article (in the August number of the Journal of the Royal Army Medical Corps) gives the results of investigations carried out on a large scale among the troops in Aldershot to test Cumming's conclusions. These results enabled Major Thompson to state that it was within units with a low rate of influenza that the methods of washing-up most closely approximated to actual sterilization, and he quotes many

[1] Paper read before the Shorncliffe Military Medical Society, on October 16, 1931.

examples in support, though he does state that in a few (notably the Royal Engineers) the exact reverse was the case. Examples of units which employed actually boiling water in their washing-up, and which at the same time showed a low incidence of influenza, certainly go to prove the truth of Cumming's conclusions; but without wishing to appear too critical, I think that any unit in which such arrangements merely approach sterilization cannot be said to be more certain of destroying the influenza infection than a unit using lukewarm water for its washing-up. In any case, Major Thompson points out that the percentages of cases among R.A.M.C. officers and the ladies of the Q.A.I.M.N.S. were respectively eighteen and twenty-three times greater than the percentage among regimental officers, so it would appear that the old idea of direct transmission could not be lightly set aside.

At the Duke of York's School in Dover, we also had an epidemic of influenza in February last. Cumming's "major avenue of transmission" (the indirect one of mess-kit water) was continuously controlled and kept closed. Always after meals all table cutlery, crockery and mugs are cleared away by attendants and passed through a steam sterilizer in which no organisms could live. This system has been in operation for years and is 100 per cent perfect in what it aims to achieve. This being so one would have expected the incidence rate of influenza in the School to have worked out at one-fifth of what it otherwise would have been.

What actually happened—to begin at the end of the story—was that the epidemic spread through the School regardless of anything put in its way, and in fourteen days it exhausted itself, having bowled over 189 boys out of 480, i.e., almost 40 per cent. Now five times this number would be 200 per cent and we need not pause to say it is impossible for *every* individual in the School to contract influenza twice in a fortnight. So here at all events the epidemic ignored the complete closure of the eighty per cent major avenue of transmission. What then was its course of transmission? In the School at all times certain common-sense precautions against the spread of infectious diseases in general are in operation. For instance, spacing of beds and accommodation in dormitories are ample. The boys *always* sleep in the head-to-foot alternate arrangement. A night watchman reports in writing every morning that he visited all dormitories at 10 p.m. and midnight the previous night to see that windows were properly open (this is an easy task as all houses are one-storied only, and the three dormitories in each of the eight houses can easily be inspected from the outside if need be). Each boy's bedding and clothing are marked with his number, no mixing up is thus possible, and all are boiled in the school laundry on wash days. Each boy has a numbered peg in the bathroom (two bathrooms per house) on which to hang his numbered towel, and on the shelf above he keeps his own numbered tooth mug. Strict orders exist against any boy in the band lending his own or playing another boy's instrument. The class rooms are centrally heated

and always well ventilated. There are only two boys to each desk. Water in the swimming bath is continually circulating (passing out, filtered, aerated, warmed, and passed in, and periodically completely changed). The boys' positions in dormitories, classes, in chapel and at meals remain the same; thus each boy has the same boy on either side of him in the dormitory and at meals (thus better controlling the spread by direct contact and facilitating the picking out of contacts should infectious disease occur). Only at week-ends are boys allowed outside the school gates for a few hours in the afternoon to go down to the town. Finally, there are the perfect washing-up arrangements alluded to.

When the epidemic appeared extra quarantine rules came into force and by the third morning were in operation, e.g., each house was quarantined except for open-air games and meals (classes of instruction for its occupants were conducted in the house recreation room). The library, swimming bath, and chapel were closed. Gargling parades morning and evening were instituted and week-end passes stopped. All were encouraged to be as much as possible in the open air. In spite of all these efforts the number of *fresh* admissions for the fourteen days was 1, 5, 7, 9, 37, 33, 40, 28, 9, 3, 5, 2, 4, 6.

I endeavoured to trace the actual course of the epidemic in its spread by keeping a spot map as the cases occurred. To explain my results I shall have to digress a little at the risk of further boring anyone who may have followed me even this length.

The School consists of eight houses, all similar. For convenience I shall allude to them as A B C . . . H. H, housing only newly-joined boys, contains fifty per cent more boys than any of the seven so-called more senior houses and has an extension of two extra dormitories. Each of these senior houses contains fifty-seven boys and H has eighty-one. While all the boys of the seven more senior houses mix freely at games, swimming, and classes, the boys of the junior school (H) live and have their being quite apart, *and only mix with the others at the three daily meals in the common dining hall.* Thus, if the spread of influenza was in any way largely dependent on indirect contact (messing arrangements, or inanimate objects handled at meals) one would expect that when once the disease had appeared in one of the seven senior houses, the next cases would be as likely to appear in H as in any of the other six senior houses (in fact the liability would be fifty per cent greater as H contains fifty per cent more boys than any other house). Yet what actually occurred was that the disease first spread into each of the other six senior houses in turn, and not until the sixth day did the first case appear in H. By then fifty-nine cases, or almost fifteen per cent of their numbers, had appeared in these seven other houses.

I have endeavoured to show diagrammatically how the disease spread from house to house, and how it behaved when once it had attacked a house. It will be seen that it commenced in F. Next day it attacked C and G;

next day D and E, then came A, then B, and finally H. Having started with one or two cases in a house it spread in a few days to its maximum there and then faded away. If indirect contact (inanimate objects handled at meals or messing arrangements of any kind) was the method of spread one would have expected a more simultaneous onset among the houses, and, while the total number of cases would show a daily increase up to a maximum, followed by a decrease, this symmetrical increase and decrease would not necessarily appear in a house, and yet it does appear in each of the eight houses.

Date	A	B	C	D	E	F	G	H	Daily total cases
12 Feb. ..						o			1
14 ,, ..			o			o	ooo		5
15 ,, ..			o	o	o	o	ooo		7
16 ,, ..	o		o	o	ooo		ooo		9
17 ,, ..	ooo	oo	oooo	ooooo oo	ooooo ooooo o	o	ooooo oooo		37
18 ,, ..	ooo	ooooo o	ooo	oooo	oooo	ooo	ooooo o	oooo	33
19 ,, ..	ooo	ooooo ooooo ooooo o	ooo	ooooo ooooo	oo	ooo		ooo	40
20 ,, ..	oo	ooooo ooooo	oo	ooooo	o	oo	o	ooooo	28
21 ,, ..	oooo			o		o		ooo	9
22 ,, ..	oo		o						3
23 ,, ..	o				o	o		oo	5
24 ,, ..								oo	2
25 ,, ..	o	o	o					o	4
26 ,, ..	o					o		oooo	6
27 ,, onwds.	←			*Nil*				→	
	21	35	17	29	23	15	25	24	Total 189

I next examined the course of the epidemic among the individuals in each house separately, i.e., in each of the three dormitories of the eight houses. I found that the disease showed a tendency to stick to one dormitory and get well going in it before it spread to another, notwithstanding the fact that boys of all three dormitories in any house mixed freely with each other at classes, games and meals throughout the day. Thus, in House D, dormitories Nos. 2 and 3 were invaded from the first, but not until the fifth day of infection in this house did the first case appear in No. 1 dormitory, and by then there were thirteen cases in the other two. Again, not until the disease had been going for eight days in House F did its No. 1 dormitory have its first case, although by then there were eleven cases in the other two. Similarly fifteen cases had occurred in Nos. 1 and 2 dormitories of House B before they first appeared in No. 3. From what I thus observed I am inclined to infer that—at all events as regards the

epidemic at the Duke of York's School—the epidemic spread by direct (droplet) infection ; that the principal opportunity for its spread was in the dormitories at night ; that not one single case occurred through infection by mess-kit washing-up water (Cumming's major avenue of transmission, alleged to cause eighty per cent of cases in an epidemic, being entirely controlled and closed). The proportion of cases due to indirect contamination as would occur in boys, infective at the time, handling each other's plates, etc., at meals, must have been extremely small, though (as already mentioned) as boys always sat at meals beside the boys who were in adjacent beds to them in the dormitories at night it might be argued that this indirect contact by contaminated inanimate objects (plates, etc.), acting for one and a half hours by day, might be responsible, yet I am inclined to think the ten consecutive hours of proximity in the quiet still air of the dormitory was a more potent cause.

To conclude, therefore, there will always be influenza carriers among us. From the epidemic I observed I infer that as regards troops in barracks you cannot block the path of infection from X the carrier to Y the susceptible, as you cannot shut off the air supply Y breathes. Gargling and nasal washing are not enough. You cannot put your susceptible where the infection cannot reach him, as it becomes impracticable to have everyone living and sleeping apart in all weathers under the open skies.

We are left therefore with one hope. Convert susceptibles into insusceptibles. This is backed up by the very behaviour of an epidemic when, as in crowded poorer localities, little is done to check it ; here it eventually automatically pulls up short and never seems to attack the full 100 per cent of the inhabitants of even a street, or often even a household. The insusceptibles, here and there, alone defeat it. Therefore create insusceptibles. How to do this is a problem. Inoculation at once springs to the mind as the means. But the vaccine must contain the causative organism and do we yet know what it is? If it is one of the organisms in the usual anti-catarrhal vaccines, have failures in the past been due to our ignorance of the length of or strength of immunity it confers?

I fear I have written a great deal that is obvious, but I felt it worth recording that I think a medical man who, in trying to check an outbreak of influenza in its epidemic forms, puts eighty per cent of his reliance upon the simple precaution of absolute sterilization of all mess-kit utensils will be relying upon a broken reed.

128TH (WESSEX) FIELD AMBULANCE. FIELD EXERCISE AT WARMINSTER IN ASSOCIATION WITH WILTSHIRE BRITISH RED CROSS.

By COLONEL G. L. THORNTON, M.C., K.H.P.

IT has been suggested to me that an account of this Field Day might prove of interest to the Corps. Schemes of a like nature have been carried out in Devon and Somerset during annual training in the past where, as on this occasion, a Brigade Camp was conveniently sited for Red Cross co-operation. The exercise about to be described followed, in the main, those of previous years as regards the arrangements made for rationing the "casualties," and for the return of the men from the Casualty Clearing Station on completion of the evacuation.

In August the 128th Field Ambulance camped with the 129th Infantry Brigade under the command of Colonel W. H. M. Freestun, C.M.G., D.S.O., and some weeks earlier Colonel Sir H. Bryan, K.B.E., C.M.G., D.S.O., County Director, Wiltshire British Red Cross, had approached us with a view to his Voluntary Aid Detachments taking part in one of the Field Days. Eventually it was arranged that a combined R.A.M.C. and Red Cross exercise should take place on Wednesday, August 5, the Wilts V. A. Detachments providing the Motor Ambulance Convoy and Casualty Clearing Station.

The narrative (stated quite briefly) informed us that the 43rd (Wessex) Division formed part of a small Northern Invading Force based on Bristol, and that at 0900 hours, August 5, 1931, the Southern Force, driven from the high ground in the vicinity of Westbury on the previous day, were now falling back in the direction of Shaftesbury. The Force Commander ordered the advance to be continued by the 43rd Division at 0900 hours, August 5, the 129th Infantry Brigade supplying the advance guard. It was expected that some resistance would be encountered immediately south of Longbridge Deveril.

The Officer Commanding 128th Field Ambulance was ordered to prepare for evacuation of casualties from 129th Infantry Brigade, establishing M.D.S. at the Drill Hall, Warminster, and to reconnoitre a site for A.D.S. in Longbridge Deveril. Both stations were to be established by 0900 hours, August 5. It had been arranged with Brigade that twenty-five light duty men drawn from the various units should report to O.C. 128th Field Ambulance at 0800 hours as casualties for the purposes of the exercise. At the same hour rations (uncooked), corresponding to these details were forwarded by the units to the Quartermaster of the Field Ambulance and passed to the C.C.S. by private car in accordance with an arrangement made with the Wiltshire County Director.

Apart from the casualties, the Divisional scheme was limited to medical personnel on this occasion, it having been decided not to attempt a complete front line evacuation during the hours at our disposal, that is in order to keep faith with Brigade in respect of our promise to return all casualties to camp by 3 p.m. The wisdom of this was apparent when the Field Ambulance took part with the 129th Infantry Brigade in a rapid advance over the Westbury country on August 7, and the chain of evacuation was completed by the collection of wounded by stretcher bearers in the field and subsequent carrying to the Regimental Aid Post.

On August 5, at 0830 hours, the casualties were transported by R.A.S.C. lorry to a point on the Longbridge Deveril—Shaftesbury Road, some 600 yards south-east of Longbridge Deveril village.

Information in the orders of the A.D.M.S., 43rd Division, gave the following locations:—

Medical Railhead, Devizes.

C.C.S., Southbroom School, Devizes.

No. 1 *Section, M.A.C.*, Devizes.

Advanced Depot Medical Stores, Devizes.

The M.A.C. (under the control of the County Director, Wiltshire B.R.C.) provided two motor ambulances, together capable of conveying six lying cases, and one six-seater and one two-seater motor car. The smaller car was to be reserved for vesicant gas cases. This transport was supplemented by one R.A.S.C. lorry from the divisional train and considered as M.A.C. provision for walking wounded.

Routine Orders had been issued: (1) from Force; (2) from Corps as regards establishment of C.C.S. and M.A.C. respectively. Force Orders also notified C.C.S. that No. 1 Ambulance Train would depart at 1500 hours, August 5, 1931, for complete evacuation of that C.C.S. which in turn would then close forthwith and prepare for move to a new location. Important also from the field ambulance standpoint, Corps Orders to M.A.C. authorized two ambulance wagons to operate above M.D.S. To make this procedure clear for instructional purposes A.D.M.S. quoted the authority in a message to O.C., Field Ambulance. It was assumed that the resistance at Longbridge Deveril had been of short duration, and that the M.O. i/c Battalion had moved forward with his H.Q., having time only for rendering first aid and dumping wounded by the side of the road at the point already mentioned—(viz., 600 yards south of the village)—the usual inter-communication with the field ambulance being maintained. The establishment of the field ambulance stations was effected well up to scheduled time.

The A.D.S. sited at a farm satisfied all requirements in respect of shelter, road communication, parking and traffic control of vehicles. The space and buildings at disposal allowed for complete isolation of vesicant gas cases in addition to the usual provision for reception, dressing, sanitation, feeding, &c. Lieutenant T. F. Arnott was O. i/c of this station with Acting C.S.M. J. Bastin, and Lieutenant W. A. Lister was O.C. Bearers.

Amongst the casualties were six lying and nineteen walking, including one officer and one prisoner of war.

The umpire, Major G. G. Drummond, reported time occupied in the whole operations, from the R.A.P. up to packing and reloading A.D.S., was uniformly within required limits at all stages.

The Drill Hall, Warminster (some four miles in rear of the A.D.S.), was particularly adapted for all the purposes of a M.D.S., and no canvas was unpacked by the unit. Traffic arrangements under the control of Lieutenant (Q.M.) M. A. Butler, D.C.M., M.M., and C.S.M. W. G. Dunn worked smoothly. The building allowed for reception and clerical duties at the entrance, while within accommodation was ample for all sitting and lying cases. It was found easy to improvise an operating theatre off the main hall. Vesicant gas cases were received and isolated without any risk of contaminating the main building or the approaches thereto. The lay-out was well thought out and methodical, and avoided congestion at all important points. The last casualty was admitted to M.D.S. at 1050 hours and the station completely evacuated *en route* for C.C.S. by 1100 hours.

Captain F. R. Sandford, M.C., was acting O.C. Field Ambulance, for the purpose of the operations, Colonel R. Ward, M.C., being a member of the Directing Staff with the A.D.M.S., 43rd (Wessex) Division (Colonel G. L. Thornton, M.C., K.H.P.), and Major G. G. Drummond. Lieutenant A. A. Eagger was i/c of M.D.S., the staff of which included R.S.M. F. Hitchens, Acting C.S.M. D. E. Quaintance, Serjeant R. A. Peardon and Corporal F. G. Murch.

The C.C.S. was established at Southbroom School, Devizes, some seventeen miles from Warminster—the distance was explained by the fact that the advance had been rapid and that a more forward location was under consideration. The school buildings (an old country house) were approached by well kept drives allowing for "in and out" traffic. The ground floor afforded all the required accommodation, although the space allotted for reception of casualties was somewhat limited, and it was thought the main entrance hall itself would have met the purpose. The pack store was admirably found in the school cloak-room. The medical and surgical wards, officers' wards, and special ward for resuscitation of collapsed conditions were well placed and methodically equipped, oxygen inhalation being ready to hand in the last ward. The operating theatre was arranged for two surgical teams and an operation necessitated by a G.S.W. abdomen was reaching completion during the tour of inspection. In the surgical wards one was especially struck by the practical nature of the improvised arrangements—an especial instance that caught the eye was the extension provided for a fractured thigh for which no special bed and suspension apparatus was available—here the essential details were completed by making fast to two chairs interlocked and lashed together at the foot of the bed.

The vesicant gas cases were well isolated, washed and treated according to the routine laid down in the Manual, the arrangements made for

the cleansing of clothing showing also a clear understanding of the requirements. The prisoner of war was allotted a special room in the building and maintained under escort. The cooking of the rations was carried out in the grounds with the use of camp kettles, special invalid foods were also prepared to meet individual cases.

The C.C.S. was commanded by Major F. A. R. Hacker, R.A.M.C. (Bulford), with Miss C. C. M. Gibb, R.R.C., Q.A.I.M.N.S. (Tidworth), and Civil Medical Practitioners, Drs. G. Laurence, R. Moore and L. Spence. By 1430 hours all casualties were evacuated, it being understood that the return to camp represented the evacuation of C.C.S. to Ambulance Train. The return to camp was effected by one of the ambulances and the R.A.S.C. lorry utilized for sitting cases from the M.D.S. All stages of the evacuation were inspected by Major-General H. C. R. Hime, D.S.O., D.D.M.S., Southern Command, who made this the occasion of his annual inspection of the Field Ambulance.

At the completion of the exercise General Hime expressed his appreciation of the smartness and efficiency of the work carried out at the various stations.

Collaboration of this kind is valuable in various ways: Firstly as regards ourselves in the R.A.M.C. (T.A.) it necessitates the strictest working to time in all stages of the evacuation; makes the exercise more real—and more especially at the M.D.S. where evacuation must be kept at concert pitch until the last casualty is loaded for the C.C.S.; gives opportunity for studying the organization of stations established behind us, and the routine governing the supply of ambulance transport and medical stores. Secondly it affords practical encouragement to the specialized voluntary effort which, judged by the success of these field days, must be still latent in an abundant degree throughout the Wessex Area.

Editorial.

THE STATE OF THE PUBLIC HEALTH.

THE publication of the Annual Report of the Chief Medical Officer of the Ministry of Health is always an event of considerable importance to the medical profession and especially to those who are mainly engaged in public health work.

Sir George Newman's Report for 1930 is on much the same lines as the one we dealt with in our Editorials of February and March, 1931.

In the Summary he points out that the Report is different from an ordinary blue book in that it deals with the apparently personal and domestic affairs of the individual instead of being chiefly concerned with large questions of public health. The reason he says is simple. "The science and art of medicine is an inductive science, founded on the study of isolated facts. What precisely is the reaction of *this* person to his environment and which makes him diseased? How and when was his disease *caused*? How was it *conveyed* to his neighbour and by what means can such causation and conveyance be *controlled*. This Report records exercise and discipline in the sphere of human affairs and nearly or remotely it is directed to the prolongation and betterment of man's life."

The population of England and Wales in 1930 was 39,806,000, an increase of 199,000 on 1929.

According to the Registrar-General's report, the population of England and Wales on April 26, 1931, consisted of 39,947,931 persons, an increase of slightly more than 2,000,000 since the enumeration in 1921. Except for the decennium 1911-21, which included the Great War, this is the lowest rate of increase recorded since census taking began in England. This great change is due almost entirely to the falling birth-rate. Improvements in rates of mortality have enabled us to maintain our present position. But the Registrar-General points out that this compensation cannot continue. By the middle of the century our population will have attained or passed its maximum. He says, " We are now observing the conditions which will shape the generations charged with the national destiny in the latter part of the present century."

Another striking change is the distribution of the population. The south-eastern counties have gained 5 per cent. by migration, while Lancashire, Cheshire, Durham and Northumberland have an adverse balance of no less than 9·3 per cent. The Registrar-General considers that it is too early to discuss whether this new orientation of the population indicates a permanent change in industrial organization, but it has, of

course, practical implications in connection with the housing and hospital treatment of the people.

The year 1930 was exceptionally healthy; the total death-rate was 11·4 per 1,000 persons, and the infant mortality was only 60, the lowest rate yet recorded. The chief causes of death in the order of mortality were: (1) Diseases of the heart and circulation; (2) cancer, malignant disease; (3) bronchitis, pneumonia and other respiratory diseases; (4) diseases of the nervous system; (5) all forms of tuberculosis.

While the low general death-rate and the diminishing infant mortality are subjects for congratulation, the maternal mortality shows no diminution. The puerperal death-rate is 4·4 per 1,000 births, compared with 4·33 in 1929. This mortality is not unavoidable; the chief cause of death is still sepsis, which indicates deficient skilled supervision before, during and after child-birth. What can be done by adequate control is shown by the fact that the Queen's Nurses attended 60,000 mothers in child-birth in their own homes in 1930, with a maternal mortality of 2 compared with 4·4 for England and Wales as a whole.

The administration of the Local Government Act of 1929 has thrown a good deal of extra work on the medical department of the Ministry and necessitated numerous inspections of the health services in the areas of Counties and County Boroughs. We have already drawn attention to this complex subject in our Editorials on the Public Health and pointed out the importance of co-ordinating the work of municipal and voluntary hospital services. The unification of the public health services of a County takes time and the work of the hospitals of the Authority, those existing before the Act and those transferred from the Guardians to the Authority, must be carried on as one service and co-ordinated with the work of the voluntary hospitals, so as to prevent unnecessary and wasteful competition between public and voluntary bodies. Sir George Newman writes: "What is needed medically is that out of the work of this Act there shall be secured a new understanding of medical co-operation for the public good, between municipal and voluntary medical officers, between hospital specialists and medical practitioners of the area, and between medical men representing the preventive and curative aspects of medicine."

During the year 1930, 11,839 cases of smallpox (variola minor) were notified in England and Wales; 900 more cases than in 1929. Clinically all the cases were classed as variola minor; there was no indication of the minor variety changing into the major variety.

Certain Metropolitan Boroughs were heavily invaded and representations were made to the Ministry that the procedure followed in the control of smallpox was not entirely applicable to variola minor, and the results obtained were not commensurate with the trouble and expense entailed. It was contended that the diagnosis of variola minor was often difficult,

and the public paid little more attention to it than to chickenpox. Notifications were often so late that it was useless to vaccinate contacts. Moreover, the public was usually unwilling to accept vaccination.

The Ministry pointed out that the regulations had been instituted before the appearance of variola minor and had been uniformly successful in controlling smallpox. They decided, however, to make an investigation of the administrative procedure adopted in various parts of the country. In four towns specially investigated, though everything possible was done, the efforts of the Medical Officers of Health and their staffs failed to eradicate variola minor. Had the major type of smallpox with its attendant mortality been in question, vaccination would have been accepted and the disease eradicated without difficulty.

With the object of guiding county and county borough councils, who under the Local Government Act of 1929 are now responsible for vaccination, the Ministry issued a review of certain present aspects of smallpox prevention in relation particularly to the Vaccination Acts, 1867-1907, for the information and guidance of local authorities, and they propose to await the experience of these bodies before considering the necessity of any modification in administration.

During the year 1930, 2,952 cases of enteric fever (including paratyphoid) were notified. Special reports relating to "enteric fever" outbreaks were received from twenty-five sanitary districts. The report from the Epping Urban District, though it refers to 1931, is of special interest. During February and March, 1931, there were 233 cases of enteric fever notified in the Epping Urban District. All the patients had consumed raw milk which was produced at a farm where a milker was proved to have suffered from paratyphoid fever. The man's wife and child acquired the disease. A second milker subsequently developed paratyphoid fever and a third gave a positive agglutination reaction. These people were removed to hospital and the milkers' places taken by others who had been medically examined. The distribution of milk was discontinued for twenty-four hours and the premises were disinfected, after which no further cases occurred when distribution of milk was resumed.

All the cases during the outbreak were removed to hospital.

It was ascertained that the sewage disposal in Epping was by water carriage, the sewage, after screening, being disposed of by broad irrigation over an ample area of land. A portion of the effluent ran into the River Lea above the intake of the Metropolitan Water Board. Sir Alexander Houston was informed and *B. paratyphosus* B was discovered in one cubic centimetre of the effluent; this result was confirmed by Dr. Scott in the Ministry's laboratory. Subsequently the deposit on the sewage irrigation area was found to contain the paratyphoid bacillus, and it was not until after a period of two months that the effluent ceased to contain the organisms. It follows that there must have been a considerable number

of infected persons in the district who either did not become ill, or who suffered from anomalous and therefore undetected paratyphoid fever.

We referred to the Epping effluent in our Editorial of December, 1931, on the London Water Supply. In his examination of sewage, Sir Alexander Houston employed the medium devised by Wilson and Blair. These observers found that it was possible to cultivate the typhoid and paratyphoid bacilli from the deposits of sewage stored in a bottle at room temperature for three weeks. The bacilli seemed to disappear from the supernatant fluid and to survive in the sediment.

Dodgson suggested that in undisintegrated fæces the bacilli may be protected against adverse conditions to which they would be exposed if free in the water. Gärtner, Rubner, and Ohlmüller have investigated this aspect of the question and claim that envelopment in particles of fæces definitely favours the survival of the bacilli. Wilson and Blair say that from the results of their experiments they have no doubt that this is the case. The experience at Epping affords striking confirmation under field conditions of these experiments.

There were 111,017 cases of scarlet fever notified in 1930 as compared with 120,232 in 1929. The case mortality was only 0·6 per cent, which is about the same as during the last six years. The mildness of the disease is largely responsible for its prevalence; unattended and overlooked cases are not uncommon. The difficulties in diagnosis are considerable, and attention is drawn to a small outbreak at Brighton and Hove, in which there was an ætiological association of scarlet fever with a bacteriologically similar throat condition, but no history of vomiting, pyrexia or skin eruption. There were 71 cases of scarlet fever and about 100 persons suffered from sore throat. The outbreak was attributed to milk distributed by a man who had no signs of sore throat or scarlet fever and yet was found to carry in his throat *Streptococcus scarlatinæ*, type 2. His son and daughter respectively suffered from sore throat and scarlet fever and also carried the same streptococcus in the throat. This streptococcus was isolated from many of the cases of scarlet fever and sore throat that had consumed the raw milk distributed by the milk vendor, who not only bottled the milk but delivered a large portion of it into his customers' jugs.

In his report for 1929 Sir George Newman made a brief reference to the serious milk-borne outbreak of streptococcal tonsillitis during November and December in Brighton, Hove, and Portslade. Over 1,000 families were affected and there were sixty-five deaths.

The outbreak occurred amongst the customers of a dairy which received milk from twenty-three farms and ceased abruptly when the use of raw milk from one particular farm was discontinued. This raw milk was found to contain streptococci.

The cases of tonsillitis were severe, accompanied by adenitis and peritonsillar infiltration. In a few cases scarlatinal or petechial rashes were

observed. There were also cases of tonsillitis on the infected farm; every member of the household of the bailiff, the head milker, and of the owner was attacked. Swabs taken from several of the patients at home were examined in the Ministry's laboratory and from them hæmolytic streptococci were isolated. These streptococci had the same fermentation reactions in sugar media as *Streptococcus pyogenes*, but the growth on blood-agar plates was characterized by (1) the relatively small zones of lysis of the red cells contained in the medium and (2) the tendency to grow in clear watery colonies, a type of colony which has been described in the study of puerperal and scarlatinal hæmolytic streptococci. Similar streptococci were isolated from the cases of tonsillitis on the farm.

Milk was examined from cows on the infected farm and from another herd as a control. Hæmolytic streptococci were isolated from the cows of both herds in approximately the same proportions, but the organisms had the characteristics of streptococci usually associated with ordinary bovine mastitis, and on no occasions were organisms found which could be identified with those isolated from the human cases both at the farm and at Hove. The failure to isolate from the cow's milk the streptococci of the type responsible for the human cases was considered to be due to the unavoidable delay in the examination of the cows, which had either then ceased to excrete this particular streptococcus or been removed from the herd.

In this connection the work of Davis and Capps is of considerable interest. The Chicago outbreak of septic sore throat reported on by Capps and Miller in 1912 was traced to farms on which there was sore throat among the milkers and mastitis appeared in the cows. This outbreak raised the question whether it is possible for milkers suffering from sore throat to infect the teats and udders of cows with contaminated hands during the process of milking.

Davis and Capps smeared the teats of a healthy cow with hæmolytic streptococci recently isolated from cases of streptococcus tonsillitis. The surfaces of the teats were uninjured and the result was negative. Smearing the uninjured teats with a greyish exudate teeming with streptococci, recently removed from a case of tonsillitis, also produced a negative result. Streptococci were never found in the milk and there was no increase in the leucocytes from any of the udder quarters.

A slight abrasion of the skin, sufficient to cause slight bleeding, was then made at the end of one of the teats near the meatus. A culture of hæmolytic streptococci was applied to the abrasion. After several days streptococci appeared in the milk in large numbers and increased up to 10,000 per cubic centimetre; the leucocytes were also markedly increased. At the end of four weeks streptococci were still present in the milk to the extent of 100 to 500 per cubic centimetre. The infected quarter of the udder was not swollen and there was no change in the appearance of the milk.

In another experiment Davis and Capps injected eight cubic centimetres

of a culture of streptococci, recently isolated from a case of tonsillitis, into an udder by means of a catheter passed into the lumen of a teat for a distance of eight centimetres; the quarter of the udder became inflamed and large numbers of hæmolytic streptococci and leucocytes appeared in the milk, which was "gargety." The excretion of streptococci continued for several weeks; the amount of milk secreted was diminished, but none of the other quarters of the udder became affected. The streptococci isolated from the cases of sore throat were characterized by a relatively narrow zone of hæmolysis, moist mucoid growth and the presence of a capsule. These characters were maintained in the streptococci excreted in the milk for four weeks; the virulence was also unchanged; they were capable of producing arthritis in rabbits.

Davis and Capps found there was a marked similarity between the onset and the duration of the experimental mastitis and the onset and duration of milk-borne epidemics of septic sore throat. They make a practical point by pointing out that it may be necessary to examine milk from each quarter of the udder for bacteria and for pus. This may explain the failure to detect the source of the streptococci in some of the epidemics of sore throat.

In the Ministry's laboratories Dr. Griffith has continued his studies of hæmolytic streptococci. Agglutination tests with them are difficult because of the great tendency of the organisms to spontaneous clumping, and because when injected into animals the serum produced is generally group in character while the type specific agglutinins may be almost negligible in amount. In consequence the production of type-specific sera, which must be of high titre to be of any use, is almost a matter of chance.

The distribution of the four principal scarlatinal types has been observed for some years at the Park Hospital of the London County Council. The virulence of the major strains has been shown to be high. The frequency of type 2 in the scarlatina in this country is interesting, as this type has not yet been found in America.

In 1929-30 the distribution of the types was as follows :—

Type 1	Type 2	Type 3	Type 4	Heterogeneous group	Total
17	19	19	7	35	97

From the heterogeneous type ten other types have now been separated, some of which have been found associated with extensive outbreaks of tonsillitis and middle-ear disease.

From the bacteriological data obtained by Dr. Griffith, it would appear that sixty to seventy per cent of the cases of scarlet fever are caused by one or other of the four chief types, while the remaining thirty to forty per cent are associated with the heterogeneous group. This latter group is supposed to have a lower power of forming toxin in the tissues, with the result that they are able to set up the complete scarlet fever syndrome only in susceptible persons. Communities which have been previously

infected with hæmolytic streptococci may have a high antitoxic immunity, so that there may be an extensive outbreak of sore throat infections without a single case of scarlet fever appearing.

The influence of previous infection with streptococci is very well brought out by the contrast between an outbreak of scarlet fever in a preparatory school, investigated by Dr. Griffith and Dr. Glover, and an outbreak of tonsillitis in a public school, investigated by the Medical Research Council's Committee on Epidemics in Schools. The outbreak in the preparatory school was characterized by a very high attack-rate (over sixty per cent, with skin rashes sufficient to warrant the diagnosis of scarlet fever); prolonged infectivity of convalescents (there were thirty-three per cent of return cases after six weeks' detention in hospital); and the presence of the streptococcus, type 2, in the cases, and in almost pure culture in two carriers. One of the carriers was a nurse who had suffered from scarlet fever in youth and had severe tonsillitis, but no signs of scarlet fever during the present outbreak. The boys in the school were young and there had been no cases of scarlet fever among the pupils for more than forty years.

In marked contrast with this school are the events in a public school, investigated for the Medical Research Council. The boys in this school were older and there had been previous epidemics of tonsillitis. The streptococcus found was type 1, which was sufficiently virulent to cause severe tonsillitis, numerous cases of adenitis and of middle-ear disease, and one fatal case of septicæmia, but did not give rise to any rash. It was considered that the previous attacks of tonsillitis due to strains not sufficiently toxic to cause scarlet fever, had given rise to sufficient antitoxin to prevent a rash being caused by the weak toxigenic strain of streptococcus, type 1.

There was only one indigenous case of malaria reported in 1931. There were 544 cases of exotic origin, compared with 495 in the previous year.

Malaria therapy continues to offer the best chance of recovery to persons suffering from general paralysis. More than 1,200 patients have received malarial infection in the natural way by the bites of infected mosquitoes. As a general rule the patients were infected with benign tertian. A new procedure was called for in 1930 owing to the requests for the reinoculation of patients who had shown some improvement after the first course, and who, it was thought, would benefit by a second course. But it was found that these patients had become, to a considerable degree, immune to the strain of the organism with which they had been infected in the first course. To meet this need three strains of malaria are now maintained at the Horton Treatment Centre. The malarial infection is allowed to persist for a long time so as to ensure a prolonged action of the malarial toxins on the causative agent of general paralysis. Unique opportunities are thus provided at Horton for the clinical and epidemiological investigation of malaria and for the study of therapeutic and prophylactic problems.

During the year, 538 cases of dysentery were notified and of these thirty-eight per cent occurred in mental hospitals. From reports furnished to the Ministry, it is evident that bacillary dysentery of the Flexner and Sonne types is a relatively common disease in this country. In certain districts it appears to be endemic. The numbers of notifications and deaths certified as due to dysentery are misleading. The cases are often regarded as enteritis, summer diarrhœa and food poisoning. Bacteriological diagnosis of dysentery is stated to be difficult ; the bacilli often die before the specimens of fæces can be examined. Swabs taken from the rectum are said to be a satisfactory substitute for specimens of fæces. The Sonne bacillus presents its own peculiar difficulties ; it is a late lactose fermenter and does not agglutinate with the ordinary polyvalent Flexner serum. Important research work on the Sonne bacillus has been done by Manifold and other workers in India.

During 1930, fewer deaths were ascribed to influenza in England and Wales than in any year since 1911—early in 1931, however, influenza again became epidemic but the returns showed that the recrudescence was less serious than in 1929.

The important recrudescences of influenza since the pandemic in 1918-19 occurred in 1921-22, 1924, 1927, and 1929. Sir George Newman's report contains diagrams giving deaths from influenza at the age-groups 0-15, 15-35, 35-55, 55-75, and over 75 years expressed as per mille proportions of the total, so that the area in each group is the same and the differences in age distribution are displayed. The diagram for 1918-19, shows that the two youngest age-groups actually accounted for twenty-five per cent and forty-five per cent of the total mortality, and the maximum in the group 15-35 is enormous. In the diagram for 1931 the maximum is in the age-group 55-75, which includes thirty-nine per cent of the total ; next comes the age-group 35-55, with twenty-three per cent of the total. If a diagram were constructed on the same lines for the pre-war period 1901-10, it would be very similar to that of 1931, except that the middle-age group would account for slightly fewer and the young aged groups for slightly more deaths. This change in the distribution is quite compatible with the change in the age structure of the population depending on the declining birth-rate.

(*To be continued.*)

Clinical and other Notes.

SALIVA-BORNE DISEASE CONTROL.—CROCKERY DISINFECTION.

By Major T. O. THOMPSON,
Royal Army Medical Corps.

In continuation of an article in the August, 1931, number of the Journal and in consequence of several inquiries, the following notes on simple and inexpensive methods of crockery disinfection are published with the hope that they may be of use in the prevention of saliva-borne disease.

(1) Hot Water Container for Knife, Spoon, Fork and Mug.

In lieu of the traditional "bucket-at-the-door," which appears to be a disseminator of infection rather than a cleanser, a bucket or tub fitted into a brazier should be used.

Water at over 80° C. can be placed in the bucket at some convenient place in the wash-up room and kept sufficiently hot during the whole time it is required.

The whole apparatus can be made from two 5-gallon oil drums, which usually vary in size.

(*a*) *The water container* is made from a drum with a smaller diameter than that used for the brazier (*b*). The top of the drum is removed and a wire handle fitted.

(*b*) *The brazier* is made from the larger drum, but cutting *out* the top and cutting away the upper third of the sides. Four metal strips, made from this cut-away portion, are riveted across as supporting bands half-way down inside the remaining portion of the drum. The cut-out top is perforated and placed loosely on these supporting bands to form the supporting base for the fire, which is made of coke or coal. The sides are freely perforated for air holes above and below the base of the fire. The water container rests directly on this fire.

This brazier requires a stone-work floor, or precautions against fire, and provision of fuel. It appears from the trials made to meet requirements.

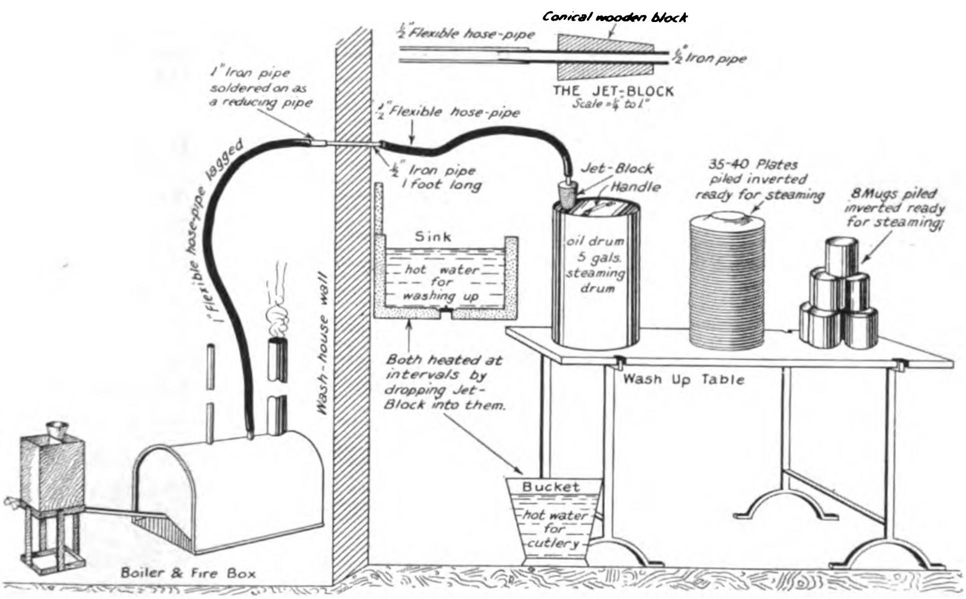
(2) Steam Disinfection of all Mess Kit.

Disinfection of mess kit is done by downward displacement of steam applied to groups of plates, mugs and cutlery actually on the wash-up table.

Steam Source.—A five-gallon cresol drum boiler, with safety-valve, filling

pipe and steam pipe, as described in a previous article on the Mule Pack Disinfector[1], on any type of fire or the kitchen range, if the latter is within reach, may be used. No pressure or other safety devices are required. Steam is led to the wash-up place by a lagged flexible hose-pipe connected to the steaming drum.

The steaming drum is made from a five-gallon oil drum with the top and its handle and filler hole left in place, but with the bottom removed. A conical wooden plug, the jet block, is fitted into the filling cap of the drum, and a half-inch metal pipe passed through the jet block as a connection for the hose-pipe. (See diagram).



Crockery disinfection (diagrammatic).

Disinfection.—Thirty-five to forty plates and eight to twelve mugs are piled, inverted after washing, in groups on a wash-up table. With steam up, the steaming drum, fitted with jet block, is placed over a pile of articles. Two minutes after steam appears from below the lower edge of the drum, disinfection should be complete. The steaming drum is removed and the articles rapidly dry off *in situ.*

The steam jet can also be used for heating up and periodically maintaining the heat of the water in the wash-up sink or bucket for cutlery. Four gallons of water can be heated from cold (6° C.) to over 80° C. in ten minutes.

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[1] Thomson, T. O., Journal of the Royal Army Medical Corps, 1928, li, 56

(3) Experimental Details.

(*a*) 4 gallons of water can be heated from cold (6° C.) to 48° C. in 5 minutes.
87° C. in 10 ,,
3½ ,, ,, ,, ,, ,, (6° C.) to 60° C. in 5 ,,
80° C. in 7 ,,
100° C. in 12½ ,,

Note.—This experiment was carried out in the open; wind, cold, and trying to snow.

(*b*) Steaming drum. (i) Empty. Time to fill with steam, 4 seconds.

(ii) Trial on crockery. Crockery quite cold (wind icy, trying to snow). Steamed direct for 5 minutes. No damage to plates, mugs or glasses.

(iii) 35 plates. (Steaming drum will hold 40). Piled in normal position on table. 80° C. and 100° C. temoine tubes placed on the top plate, middle plate, and bottom plate. Steam appeared from the bottom in 1½ minutes.

	Top plate		Middle plate		Bottom plate	
Temoine tubes melted at temperature	80° C.	100° C.	80° C.	100° C.	80° C.	100° C.
Then steamed 1 minute more	Yes	Yes	Yes	No	Yes	Yes
or steamed 2 minutes more	Yes	Yes	Yes	Yes	Yes	Yes
(iv) 35 plates. Pile *inverted* on table. Temoine tubes as before. Steam appeared in 1½ minutes. Then removed at once	Yes	Yes	No	No	No	No
or steamed 1 minute more	Yes	Yes	Yes	No	Yes	Yes
or steamed 2 minutes more	Yes	Yes	Yes	Yes	Yes	Yes

Note.—The plates dry out completely if left inverted after steaming.

(v) 8 mugs piled in normal position in 3 tiers. Temoine tubes in each tier. Steam appeared in ½ minute.	Top mug		Middle mug		Bottom mug.	
Then steamed 1 minute more	Yes	Yes	No	No	Yes	No
or steamed 2 minutes more	Yes	Yes	Yes	Yes	Yes	Yes
(vi) 8 mugs piled *inverted*. 3 tiers. Temoine tubes as before. Steam appeared in 55-60 seconds.						
Then steamed 1 minute more	Yes	Yes	Yes	Yes	Yes	No
or steamed 2 minutes more	Yes	Yes	Yes	Yes	Yes	Yes

(vii) 8 mugs piled and Phipsons' electrical indicator, set for 99° C., packed with wood shavings into the bottom of the mugs. Steam appeared in 10 seconds (mugs warm as from washing).
Bottom mug, normal position, indicator went in 1 minute 50 seconds.
,, ,, *inverted* ,, ,, ,, in 1 ,, 30 ,,
Middle ,, normal ,, ,, ,, in 1 ,, 55 ,,
,, ,, *inverted* ,, ,, ,, in 1 ,, 30 ,,

Note.—In the inverted position each mug or plate gives a local downward displacement of steam as soon as the steam can get in below the edge.

(viii) Cultures of salivary organisms placed inside and outside a tin container and mug (agar slopes and plate).
Outside mug: steamed 1 minute; agar melted; no growth.
,, ,, ,, 2 minutes; ,, ,, ,,
Inside mug: ,, 1 minute; agar did not melt; shows growth.
,, ,, ,, 2 minutes; agar melted; no growth.

All the above times and results were checked several times and averages taken.

It may be concluded therefore that steam disinfection of messing utensils can readily be carried out by this method. Steaming, with adequate disinfection, should take one to two minutes for each load. The apparatus

is simple and inexpensive, but will require a definite daily provision of fuel for the work and personnel to carry it out.

My thanks are due to Lieutenant-Colonel G. S. Wallace, O.B.E., R.A.M.C., for suggestions and permission to carry out the experiments.

REPORT ON A CASE OF TETANUS WITH RECOVERY.

By Major C. L. FRANKLIN, M.C.,
Royal Army Medical Corps,

AND

Captain J. S. McMILLAN,
Indian Medical Service.

The patient, an Indian, aged 7 years, was brought to the Cantonment General Hospital, Cawnpore, on June 2, 1931, with the following history :—

About two weeks previously he had sustained a severe lacerated wound of the right hand, the result of a fall. He had been attended by a Hakim in his village, who, no doubt, did not possess the necessary instruments and antiseptics for dealing with such a case.

On admission, there was an extensive lacerated wound of the right palm, the tissues being devitalized with extensive sloughing. The flexors and extensors of the wrist were extensively involved; indeed, the hand was merely a bag of pus. The general condition of the patient was poor, and a moderate degree of pyrexia was present. He had well marked "trismus and risus sardonicus," the muscles of the neck were also fixed and rigid, but muscular cramps were not present.

When admitted he was given 1,200 units antitetanus serum (English) by the intramuscular route. Subsequently, a general anæsthetic was administered and lumbar puncture performed. Ten cubic centimetres of cerebrospinal fluid were withdrawn and replaced by 9,000 units anti-tetanus serum injected slowly into the intrathecal space. The palm was opened up and drained, sloughs and devitalized tissue being removed. Amputation was refused by the parent in spite of strong representations. The same evening a further 3,000 units antitetanus serum were given. The dose of 3,000 units antitetanus serum was repeated daily for the ensuing five days.

On the third day following the administration of antitoxin intrathecally, there was some improvement, the mouth could be opened slightly and a little fluid swallowed. At the end of seven days the mouth could be opened widely, and the patient eventually made a good recovery.

Hydrogen peroxide and eusol were used for dressing the wound which, after several further incisions, healed with inevitable deformity. Generally, bromides and chloral were exhibited for their sedative effect.

The fear of tetanus is always with us in India, but this case, though not entirely unusual, presents some features of interest. In this particular

case the incubation period was prolonged, which favourably influences the prognosis, provided that such symptoms as hyperpyrexia or delirium are absent.

The age of the patient was against his recovery. The refusal on the part of the parent to allow amputation in spite of strong representations also militated against the patient's recovery, for we were unable to remove the source of the supply of the toxin.

At the outset the case was considered to have little chance of recovery, but fortunately in this we were wrong. In future it is probable that we shall be more optimistic in making a prognosis in such cases.

Echoes of the Past.

THE REMINISCENCES OF AN ARMY SURGEON.

By Lieutenant-Colonel W. A. MORRIS,
Royal Army Medical Corps (*Ret.*).

(*Continued from Vol. lvii, p.* 390.)

A few days after returning to Simla, I received orders to report at Mian Mir for duty. I never wished to be sent there but one must take the "rough with the smooth," and I did not find it half as bad as it is usually painted or as I expected. As a station for any troops it was downright unsuitable, but as the Cantonment for Lahore there was no other site. The name Mian Mir has been given up, and now this post is called "Lahore Cantonment." The legend which has held the field for many years is that there was considerable difficulty in selecting a site for the Cantonment of Lahore. The higher ground to the north of the old city was unsuitable while the opposite quarter was composed of graveyards and also frequently flooded by the river Ravi. Sir Charles Napier is reported to have settled the matter himself by riding out on the plain to the present site and pitching his sword into the soil declaring that spot to be the centre of the future Cantonment of Mian Mir. In justice to Sir Charles it would be difficult to have found under the circumstances a better place or one more adapted to the requirements at Lahore than his choice, though it turned out to be a most unhealthy station for any troops. Cholera savagely attacked it annually, and deadly fever was nearly always present. So bad was it, that it earned the soubriquet of another "white man's grave." Very active sanitation had ameliorated considerably the health of the troops when I was sent there, and the terrors had almost gone. Yet, there was much more calling for action. Water was laid on from a small waterworks for drinking only. I think this supply was derived by a water canal from the

river Beas. The effect of this was to lessen the incidence of cholera, but enteric fever still thrived as the river passed through a native village. It was the custom to flood the rhines through the station in order to water gardens and roads. I condemned this practice absolutely in my own mind, but then some supply was necessary because of the dryness of the soil. It was about this time or a little after that Ross triumphed over malaria; it was then quite easy to understand the malaria at Mian Mir. It was chiefly derived from the rhines and pools of water forming foci of malarial infection. Sir Power Palmer, the C.-in-C., whom I had known intimately for years, asked me how long a British Corps should remain in Mian Mir, and I suggested one year and at the outside two. He immediately applied this suggestion and the guns which should have returned from manœuvres to Mian Mir went to Amritsar and Pindi.

I remember one other sanitary incident at this station. I forget what led up to it, but orders were given to open one of the old cess-pits which had been permanently closed for years. These were either under, or adjoined, the barracks. All that was discovered was a dry space with the debris of ancient deposit in a dust, and not as much as we expected. There was no smell or anything objectionable, and it was closed up again. Examination of some of the deposit proved absolutely negative.

I believe Lahore Cantonment has now been robbed of all these dangers. I used to read every year the Annual Reports of the Sanitary Commissioner with the Government of India. They were important and most useful aids to us all, and well edited by Colonel Leslie, I.M.S., who has long since crossed the river. This pleasant, studious and quiet man was a loss to us all, and I knew him well.

But to return to my narrative.

When I reported at the hospital, I found the officer I had met on my recent travels and had helped in some of his difficulties. He was in temporary charge, but I noticed a whisky and soda by him as he saw the morning sick. In the plenitude of his wisdom he asked me to take charge of the stores, and my first demand was the return of some bottles, which had been required for the morning sick. This was immediately complied with and the matter ended. He left at once for Multan, and Surgeon-Major M—— took his place. M—— was a good and strict officer, but led a most parsimonious life. He lived in a small room in the hospital as no bungalows were available. He was soon succeeded by E. A. Mapleton, a delightful man with no queer ways.

We had many friends in Lahore among whom was Sir D. P. Masson, the owner and Directing-Manager of The Punjab Banking Company. He possessed a higher and much greater title, as "the Subaltern's Friend." No youngster or older man with some temporary difficulties ever saw D. P. Masson and told his story honestly but was received with sympathy and great kindness. He gave away a great deal to deserving charities and is remembered to this day, when his bank has disappeared, as a great and good

man. He commanded the Volunteers at Lahore, and was an A.D.C. to the King. Masson was a great friend of ours, and we met him after he had retired. He returned to Kashmir for some years, and then after a short illness died. I remained for five months at Mian Mir and was then transferred to Bareilly. I had not been there since the time I was so hospitably entertained by Mr. Bullock, and was pleased with the change. My wife had a predilection for poultry farming, and had some good stock which she elected to take with her. Nothing would induce her to let them travel in the guard's van, because of the heat which was then commencing. I reserved a first-class compartment, and in the lavatory my wife established her poultry yard, fowls and ducks, and as we had parrots and dogs with us, the journey was trying. At every station and through the livelong night the ducks quacked, while within a few feet of us, at sunrise a rooster heralded the approach of another day. At Lucknow the station-master made a feeble protest, but the farmyard reached Bareilly quite safely. Lieutenant-Colonel Seymour commanded the Hospital and both he and Mrs. Seymour did much to make things pleasant for everyone and were deservedly popular. Major-General Meiklejohn commanded and I rented his house for the hot weather. The Border Regiment was stationed here and was very hospitable and gave some pleasant entertainments. There was a good Club and a nine-hole golf course on which I remember a fascinating shot over a jheel; I have lost any amount of balls there. After exercise we congregated at the Club and cooled ourselves inside and out with the excellent means provided.

I remained at Bareilly for the summer and spent two months' leave at Naini Tal. I have already described the natural beauties of this place, and there is nothing but the incidents of this visit to record. The lake was the centre of attraction, and since my last visit a first-rate boating club had been established. My old friend, Geoffrey Hall, now Colonel, was living here with Mrs. Hall. He was the Commodore of this Club and owned the Ullydia, and was very successful in the sailing competitions. Harry Thompson (later Sir Harry) sailed a beautiful boat which he had imported. I think he would have preferred a smaller one, but we should have lost the beautiful lines and sailing of his model. I have seen eight boats start and race, and it was a delightful scene. The Commodore gave a splendid lunch this year at the Boat House, which was a conspicuous success. Now and then a casualty occurred, but there was no loss, just a spice of danger which the Briton loves.

Concerts, dances and tennis parties succeeded each other. The music was of considerable merit, and led by Mrs. Iggulden, the wife of Captain Iggulden (now General, with a great record). She was an accomplished pianist, possessed a divine voice, and was the most talented amateur actress I have ever seen. There was one officer who was devoted to singing, but was never in tune. It was a calamity we could not arrest, and consequently had to endure. He was sublimely unconscious of his weakness, and this made it still more pathetic.

In October, 1899, I was transferred to Fatehgarh, near Cawnpore. It is on the right bank of the Ganges, well laid out, with a Collector and a small civil community. My charge was the Gun Carriage Factory and two companies of Infantry. Captain Gayne was my assistant.

My dear old friend, Pennington, was the senior civilian here in the capacity of Sessions Judge. He lived with us, and made himself so pleasant and adaptable that he became one of us. The Collector was Mr. Warburton, who played the 'cello well, and with the Settlement Officer, Mr. Hoare, with whom he lived, gave many musical evenings. Hoare could sing well.

The nearest city was Farukhabad, and we frequently drove there. The only interesting feature I recollect was a monument to Dr. Hamilton, who was civil surgeon years before. The inscription runs :—

SACRED TO THE MEMORY OF THOMAS
HAMILTON ESQUIRE WHO DIED 12TH AUGUST 1788
AGED 60 YEARS. THIS MONUMENT WAS ERECTED
BY MAJOR A. FARMER, EXECUTOR.

Farukhabad came into the possession of the English about 1774, when they supported the Rohilla Nawab and defeated the rebel Rohillas, and conquered Rohilcund. In 1801 the whole was ceded to the Honourable East India Company, and with one more successful battle, Lord Lake drove Holkar with the rebel Rohillas away, and utterly routed them. It has since belonged to the British. This account would seem to place Dr. Hamilton as a P.M.O., or an S.M.O., with the John Company's Troops.

When the Mutiny broke out the Europeans were attacked, and escaped by boat from Fatehgarh, only to be caught and butchered by the infamous Nana Sahib at Cawnpore. I knew two members of the station who alone escaped. Mr. Gavin Jones put off in a boat which was sunk by the enemy, and he was severely wounded. Full of pluck, he determined to try and save himself. He swam for miles down the river, till worn out and exhausted he landed, and was taken to a small village in the jungle. There the natives treated him kindly. Eventually he escaped, and that village never had cause to regret what they did for him. He became a flourishing merchant at Cawnpore and owned the Empress Foundry. I met him at Cawnpore; he was then over 70 and looked very strong. He retired to England and died soon after. Mr. Churcher was the other. I believe he was the son of a well-known English officer. He had lived at Fatehgarh all his life since the Mutiny. When the mutineers attacked, he escaped from the Fort by concealing himself under a fresh sheepskin and blacking his legs. He died a few years ago.

The health at Fatehgarh was good and I had no admissions for enteric fever, but it raged all around, especially at Lucknow, Cawnpore, Allahabad, Bareilly, and other places. At all these were Government farms, instituted to provide good milk to the troops. I watched my charge carefully, and it was pure luck that it did not become infected. The handling of milk and all

that that implies I scrutinized at the hospital, to which a certain number of animals were driven from the Golden Dairy, as it was called. At the hospital the cows were milked under European supervision, and we made our own butter. The Golden Dairy was on the edge of cantonments and out of my range of inspection. The Civil Station believed in it; I, as representing the health of the cantonments, became curious and interested, but had to be tactful. Later the proprietor showed me over this dairy and I saw about twenty-four animals, mostly buffaloes, in the cleanest and airiest of byres. They were evidently well fed and groomed, but I noticed that only three or four were in milk and some calves were in one stall together. I was then shown the butter department and four or five separators. Some butter was made, but much cream was sent to customers by train. I then found out the amount of cream sent away by train, this was out of all proportion to that derived from the dairy animals. The customers included all the Government farms at Allahabad, Cawnpore, Lucknow and Bareilly, public tea rooms at Lucknow, and a Judge of the High Court at Calcutta, where the Golden Dairy had an agency. I knew of the enteric in the military stations, and I knew that the Judge was favourably disposed to this dairy. One day I read in the paper that this gentleman's daughter was down with enteric, and later that she had died. I became most interested, for I was not satisfied with what I had found out.

My difficulty in investigating was that officially I had no concern with this dairy, and I did not want to be unfair or prejudice the interests of this enterprising native, who after all was acting quite honestly as far as he knew. If I had impeached the dairy locally I could have been proved to have only advanced a personal view, with no really proved evidence. The latter, at its best, was only deductive and incomplete. But I had not to wait long to complete a chain of evidence.

It has always been my habit to ride about the station in the early morning and look into things myself. One day I had ridden out of cantonments when I met some natives coming towards Fatehgarh with earthenware *ghurrahs* covered with cloths on their heads. I asked what they were carrying and was told that it was cream for the dairy. I followed this clue up with the help of an Assistant Surgeon, who traced out eight buffalo stations all supplying cream to the Golden Dairy. A station consisted of two or three buffaloes in a native village with a separator alongside. The milk was separated in these places every morning and sent into the dairy. The report was that they were kept clean and the animals properly fed, and it was abundantly evident that the proprietor of the dairy was acting honestly up to his knowledge. A sanitary officer must be scrupulously fair, and in this case I could only really infer that enteric was conveyed from a village to the dairy and then infected a customer. Cream cannot be handled and carried from such places without risk of cholera or enteric and allied infections. The vibrio dies quickly in a weak acid, but the enteric bacillus resists for a long time. I sent a full report to the P.M.O. Lucknow,

the result of which was a question—"Did I not know that enteric was nearly always derived from native sources?" My report was pigeonholed and I was regarded as a visionary.

My wife left for Simla at the beginning of the hot weather and I remained with my charge. I was in splendid health and took a lot of exercise, but this was to be rudely upset in a few days. One of my recreations was photography, and not far from cantonments I had marked a picturesque old temple on the bank of a small stream at the point where it entered the Ganges. One evening about 6 p.m. when the shadows were lengthening I drove as close as I could to this spot, and walked down a winding course to the Temple. When I reached the end I was on the wrong side of the stream, but seeing a small "dug out" I turned it over and pushed myself across a very short distance. On turning the boat over a cloud of mosquitoes flew out and annoyed me all the time I was there, perhaps half an hour. I took my picture and drove home and thought no more about it. A few days later I was asked to dine with a Mr. Burt, a retired P.W.D. officer. I arrived at the house feeling very well and pleased with everything, and spent a delightful evening. At dinner I talked with fluency on every subject that arose. Nothing seemed amiss and everybody seemed to wish to hear me talk. It was extraordinary. After dinner I sang and played the piano with facility and ease. Now I do not talk much as a rule, and though I am musical, I can only vamp a piano. Later I returned home as well as I ever was.

At 6 a.m. the next day I did not get up as usual, my head was swimming and I felt cold. My servant brought me some tea which immediately started sickness. Taking my temperature I found it was 105·4° F. The Assistant Surgeon looked after me, and I was put on the sick list. I do not remember much for a few days; I soon became clear in my mind, but was so weak that I could not stand. I was given leave to Simla. An officer relieved me but I do not remember his name. A day or two later it was arranged that I should start on leave, and having had my things packed, and a bottle of brandy and a bottle of whisky put into my tiffin basket, I was taken to the station and laid out on a couch.

I became very ill in Simla, and was attended by the Civil Surgeon, C. P. Lukis, who afterwards became Surgeon-General Sir C. P. Lukis, and he invalided me to England. I had to return to Fatehgarh, and on my way had to wait at a little junction named Hathras for many hours. We were quite unprepared for this, so my wife asked, "Station Master, is there a refreshment room here?" He replied, "Oh! my God, no." "Can we get anything to eat?" "Oh! my God, no." It was disconcerting, but alas, only too true. When our train arrived we asked this official if it went to Fatehgarh, to which he replied, "Oh! my God, yes."

A few days later we left our station and embarked on the "Arabia" for England, and on our arrival in the old country I had completely recovered. But for about three years I had an occasional attack of fever. I called at the

War Office and was interviewed by Sir William Taylor, K.C.B. I did not want to return to India, but to get out to Africa. I had known Sir William fairly intimately a few years earlier, and thought he might try and send me out. He told me that it would be difficult and that I must either go back to India or remain on leave, and advised the latter. Of course, I acquiesced, but I was disappointed. The difficulty was that I was on the Indian roster and could only be sent with the approval of the Indian Authorities. I then went to Arundel, and not to the Cape.

I had not been long in beautiful Arundel before I was invited to join the Committee of the Naval and Military Exhibition at the Crystal Palace. The Ambulance Section was handed over to my charge, and arranged in the Egyptian Courts. This work threw me among some very charming people.

Lord Roberts opened the exhibition and it was a great pleasure to me to show him my Section. He knew me at once, and reminded me of some incidents I never suspected he had heard of. His kindness and appreciation were most encouraging. It was the last time I ever saw that splendid man. I had occasion to refer to him once in a paper I had written, and received a charming little note thanking me for thinking kindly of him. What a help! kindness such as Lord Roberts showed encourages those who are humbly trying, and how uncommon it is. It is the very salt of endeavour. Lord Roberts, I have been told, could express himself forcibly and to the point when it was necessary, and those who had ever been pitched over an official wall by him knew that they richly deserved it.

In the autumn I was posted to the Cambridge Hospital, Aldershot, for duty. Here for the first time I heard the R.A.M.C. Band play under Mr. Bennett. For a great many years we desired to have a band, and many were the efforts made to secure one. The first real attempt was made at Netley, and the only friend we had was our Colonel, H.R.H. the Duke of Connaught; he was always sympathetic and understanding, but he knew nothing about our scratch band. It was formed in 1893, and consisted of a Paymaster Serjeant, who played a cornet, two orderlies, Captain L. P. More, myself, and Major Aylmer Hayes. The cornet had a friend who conducted us. I played second fiddle, a viola, and a drum. Beyond drawing out a single note on the strings, or whacking the parchments, I was completely uninstructed. More was distinctly good. We played easy music and "Love in Idleness" was our *pièce de résistance*. The chief feature was our independence of all phrasing and execution. The latter was wild. We all thought we knew how the tune should go. Lastly, we liked our leader, but held perfectly independent and original views of him as a musician. Yet our gallantry saved us; undaunted, we stuck at nothing; and we felt aggrieved if we did not play on special guest nights, as we often did. Many may not believe it, but if we had not stuck to our brass and brazened it out in those early days there might have been no R.A.M.C.

Band. We should be sculptured with our instruments in a group outside the Mess to inspire the present splendid band, which I hope to hear again before I clear out.

In March, 1902, I found myself once more at Allahabad. My pleasant tour fifteen years earlier has been described in these pages. When I reached Allahabad Railway Station my old bearer, Surdoo, was waiting for me. How he discovered that I was there puzzled me, for I had not called him. He took me in charge at once, and told me that he had warned for rooms for me at Lauries Hotel. I was very glad to have him again.

I called on Colonel Beamish, the P.M.O., a well-groomed, clever, able, alert man, and known as a capable and strict officer. He was a great linguist, and had travelled much. I took over the hospital from Major Douglas Hunter, D.S.O., a fine officer, who had distinguished himself in Egypt. He returned to that country later and became P.M.O. Mrs. Hunter was a very beautiful woman, and was much liked. It caused me real pain to hear later that Hunter had passed away, and I felt deeply for the good woman left to mourn him. Another officer was Captain O'Grady, a charming personality, a good rider, who later married Miss Burkitt, the daughter of Judge Burkitt of the High Court.

I joined the N.W.P. Club or U.P. and Oude as it is now called, and there I met some of my old friends. Ross Alston, Porter, Howard, Micky Malcomson, and a few others. Alston, who is now Sir Charles, joined at Allahabad in 1883, and through the greater part of that time was the most noted barrister in that part of the country. He married Miss Howard, the daughter of another barrister. She was an accomplished and very musical person, and I spent many delightful times with them.

Sir John Stanley was the Chief Justice and had succeeded Sir Comer Petheram. The other judges were Knox, Aikman, Burkitt, and Blair, all of whom kept open house. I dined out thirty-six times in three months, which is not a bad average. There is a Judge Reeves there now, then a barrister married to a gentle and popular lady who organized and managed an excellent library for us.

Just as the hot weather set in, Mr. Justice Aikman asked me to live with him. We became good friends, and it was a genuine pleasure living with him. He was a particularly cultivated man, and could be very amusing in his conversation. I got a wigging from him once, which I perhaps deserved. It was in this way.

One morning on my arrival at the hospital, the Matron reported that some coolies or transport men had been grossly rude to the Sisters, and that she could not tell me the details. This lady was no prude, and would never have reported such a matter, except for the gravest reason. I paraded the culprits on the spot and directed a corporal and another man to pull them in turn up to a tree and administer six cuts with a crop which I handed them. After a few minutes they were put at their work. . . . When I returned and met the Judge at breakfast, I told him of the inci-

dent, and to my surprise he took me severely to task for taking the law into my own hands, and at once wrote a letter to the Collector and sent me with it. I forget who he was, but he told me to stay with him, and later introduced me to an assistant magistrate, with instructions to keep the incident at the hospital to myself.

However, nothing followed except that every native who passed me gave me an unusually grave salaam as he passed. The effect was really good, but it had caused me some anxiety.

Major-General H. A. Abbot, C.B., commanded the Brigade. He was a soldier with a great reputation and had seen much active service. He had commanded the 15th Sikhs and had brought his regiment up to a very high pitch of efficiency. He was a short stocky and powerful man, with a clear penetrating eye, and knew what he wanted and could get it. Mrs. Abbot was a most charming and hospitable lady, and very popular with everyone. I was frequently at their house in Cantonments, and liked them both very much. I met them again later at their home at Mashobra, well known as "The Peak." The General had retired there, and was then as alert and smart as ever.

I remained at Allahabad during the hot weather, and took no leave. Life became rather monotonous at times, but something occasionally turned up to relieve it. One great day was the Coronation of King Edward VII. The station was *en fête*, and there was a general holiday. . We celebrated it by a Coronation Dinner at the Club. Everyone was present, and the feast proceeded in a most genial and successful manner. Some very good speeches were made, and a splendid evening was spent. No King ever had a more loyal and devoted party drinking his health on that day. All our sympathy had gone out to King Edward and his dreadful illness, and it had increased our devotion and loyalty very much.

Every week there was a special day at the Club, and I used sometimes to find a friend and ask him to dine with me; we would have a bottle of "Simpkin" each, and feel all the better for it. These dinners were served on a beautiful lawn, and on separate tables. Lamps were hanging all round, with the moon shining over the dark green shade of the trees. A band played choice music throughout. Good style and well-bred form were always very evident on these occasions. The ladies were well dressed and looked their very best, and I think the snow-white uniforms and coloured sashes of the officers helped to give a completeness to what was always to me a very beautiful sight.

I had quarters at the Club after Mr. Aikman left, and I recollect the quaint barber who used to visit me about 6 a.m. The barber is a retailer of news, and every whit as efficient as his type in England. I have been told that their skill is so great and their razors so keen, that they can shave a face without waking the victim up. I also have heard that they can operate with a piece of glass with great dexterity. This man had travelled as a ship's barber to Glasgow, and told me that he liked it, except the Bay of

"Biscuit." "Why 'biscuit,' barber?" I asked, when he replied, "I always felt so hungry, sahib." I suppose afterwards.

The days passed very quickly, and my orders to embark on the "Syria," came almost too soon, though I was naturally anxious to return home to my family. I was treated to another round of farewell dinners, and finally was seen off by many kind and good friends, and thus ended one of the pleasantest hot weathers I have ever experienced. I registered then and there a vow to exchange back to India as soon as I could, with the help of my friend, Mr. Prince, the exchange agent.

The voyage home in the "Syria," commanded by Captain Hyde, was uneventful except that we experienced some very severe weather.

There were some charming young fellows on board and among them Lieutenant Francis Mackworth of the Royal Field Artillery. He was at Allahabad with me, and I had attended him through an attack of enteric fever. He came from the same city in Monmouthshire that I do, and we have been neighbours many years. Francis Mackworth was very much liked for his gentle and pleasant ways. He had not been well enough to take much part in the events I have noted at Allahabad. Besides he had been sent to the Hills to recoup. His father was Colonel Sir Arthur Mackworth, Bart., C.B., R.E., and belonged to a family of soldiers. Three sons were killed in the War, and this tragedy hastened the death of his father and his gentle mother. The present baronet lives in Monmouthshire, and is a good friend of ours.

(*To be continued.*)

Current Literature.

Buschke, A., and Curth, W. **On the Extragenital Localization of Lymphogranuloma Inguinale.** *Klin. Woch.*, 1931, No. 37, p. 1709.

In a man, aged 54, and two to three weeks after connection with a prostitute and indulgence in cunnilingus, an erosion appeared on the tip of the tongue. About two weeks later a slightly painful glandular swelling appeared on the left side of the neck and slowly increased in size. In seven weeks the left submaxillary glands were about the size of a fist, firm in consistence and with the skin stretched tightly over them.

The glands were punctured when they softened and thin fluid pus was obtained. The pus was sterilized and diluted and when injected subcutaneously into the patient and into patients suffering from lymphogranuloma inguinale it gave a typical lymphogranuloma reaction. Also fresh antigen from lymphogranuloma patients gave a positive reaction in this case.

The submaxillary and neck glands had to be removed, and their histological structure was that typical of lymphogranuloma inguinale.

This is the first recorded case of "Extragenital Lymphogranuloma Inguinale" contracted by sexual intercourse.—From *Archiv f. Schiffs- und Tropen-Krankheiten*, 1931, *No.* 11.

Meyer, K., Rosenfeld, H., and Anders, H. E. **Successful Transmission of Lymphogranuloma to Guinea-pigs.** *Klin. Woch.*, 1931, p. 36.

All of ten experimental injections of pus or gland pulp from lymphogranuloma patients into the inguinal region of guinea-pigs were successful, there being swelling of lymph-glands and general infection. In all cases the disease was transmitted from these animals to other guinea-pigs. One virus was transmitted for five generations and another for twelve.

It was found that the virus can pass through a Berkefeld filter, and that it has a high resistance to heat and to the action of glycerine.

The specific process in the injected guinea-pig did not remain at the site of injection, but spread to neighbouring lymphatic tissue, also hæmatogenous metastases appeared in the lungs and liver.

The histological appearances in the lymphatic glands in the affected animals were identical with those in human cases.

Extracts made from infected material taken from the animals gave a positive Frei reaction when injected into human beings suffering from the disease.—From *Archiv f. Schiffs- und Tropen-Krankheiten*, 1931, *No.* 11.

COHEN, A., and KLEEBERG, L. **Experimental Observations on Lymphogranuloma Inguinale.** *Dermat. Woch.*, 1931, p. 580.

Cultivation experiments were negative, as also was the attempt to infect a cynomologus monkey by intra-preputial injection of tissue from a lymphogranuloma gland. However, a successful result was obtained by intra-cerebral inoculation into a cynomologus monkey of 0·1 c.c. of a 1 in 5 dilution of pus from an infected gland, the monkey becoming ill in sixteen days and dying two days later.

Cerebro-spinal fluid removed from this monkey on the sixteenth day and heated for three hours at 60° C., and meninges rubbings similarly heated, both gave positive skin reactions (Frei's reaction) when injected into five patients suffering from lymphogranuloma, while similar injections into healthy men gave no reaction.—From *Archiv f. Schiffs- und Tropen-Krankheiten*, 1931, *No.* 11.

RONNEFELDT, F. **Plasmoquin Prophylaxis (of Malaria).** *Münch. med. Woch.*, 1931, No. 6, p. 240.

In view of the meagre reports of the prophylactic use of plasmoquin and because there is a natural disinclination to use this drug prophylactically, the author thinks it desirable to record his own experience in Liberia, although it is not extensive. He and his wife have taken daily for over eighteen months, one tablet of plasmoquin compound, containing 0·01 g. plasmoquin and 0·125 g. quinine. Also their children took a similar tablet every other day, one child from the second to the third year, and the other from the twelfth to the eighteenth month.

Amongst the author's European patients were three men and one woman who had taken plasmoquin compound (two tablets) daily for over a year. In no case did any sign of toxic action appear.

The plasmoquin compound was considered to be more agreeable than the quinine prophylaxis previously used—0·2 g. daily with occasional larger doses.

The author states that he does not discuss in this paper the value of prophylactic remedies, nor which is the best method of prophylaxis to employ, as the question is a difficult one on account of the varying conditions met with.

HOLT, R. L. **A New Mosquito Spray.** *The Military Surgeon*, 1931, lxix, 625.

An outbreak of dengue in Manila led to search being made for some efficient means of destroying mosquitoes in human habitations, dealing with mosquito breeding places being insufficient, chiefly owing to want of control over the premises of the native population.

Many commercial preparations were tested in the laboratory and in a hospital, and the average killing efficiency was found to be only about twenty-five per cent. It is thought that in practically all these preparations the active constituents are obtained from pyrethrum.

The pyrethrum extract is a brown oily substance, and Major Holt endeavoured to find the most suitable substance with which to extract the active principles of pyrethrum from this fluid. The best solvents are carbon disulphide, acetone and chloroform, and with all of these substances were obtained which were good from the mosquito-killing point of view; but with the first two solvents there was toxicity to man and high inflammability, and carbon disulphide extract had an objectionable odour.

The method of manufacture of the chloroform extract was as follows: 240 grammes of fresh pyrethrum powder were treated with 408 cubic centimetres of chloroform for two hours and then filtered. About 350 cubic centimetres of filtrate were obtained and kerosene was added to make the volume up to one gallon.

Experiments were made in the Sternberg General Hospital, in wards of about 100,000 cubic feet in size. About 350 cubic centimetres of the fluid were sprayed high up near the ceilings of the wards, which were not closed up. A paint spray gun worked by compressed air was used. A faint mist of spray was visible throughout the ward.

Mosquitoes in net cages were placed on the floors of wards five minutes after spraying, and about ninety per cent of the insects were found dead in thirty minutes, the cages being removed and kept overnight to see that none of the insects were alive.

The spray was found to be fatal to cockroaches and flies, but ants were more resistant.

The cost is about one dollar per gallon, but the author considers that the great efficiency of the fluid makes up for its cost.

STALLYBRASS, C. O. **Immunization against Scarlet Fever.** *Journal of State Medicine*, 1931, xxxix, 703.

In this paper, read at the Frankfurt Congress of the Royal Sanitary Institute, Dr. Stallybrass, who is Assistant Medical Officer of Health of the City of Liverpool, begins with three assumptions: (1) That hospital isolation is in itself insufficient to prevent or even to greatly reduce scarlet fever; (2) that the disease is caused by a hæmolytic streptococcus which produces an exotoxin; (3) that to combat the disease we have to rely mainly on artificial immunization with a hæmolytic streptococcus or its products. The writer then mentions the introduction of artificial immunization by Gabritschevsky, in Russia, in 1905, when broth cultures of scarlatinal streptococcus were used. In 1923 and 1924 the Dicks isolated a hæmolytic streptococcus with a soluble toxin, produced an antitoxin, and introduced their well-known skin test for immunity. Zoeller and others, in 1925, produced an anatoxin (or toxoid), and the author quotes the results of various workers in producing immunity by toxoid, the results being tested by Dick tests.

In Liverpool immunization against scarlet fever was begun in 1926, first among nurses and others in fever hospitals, then amongst children in

orphanages, hospitals and other institutions, and recently amongst the general population. In the City Hospital, Fazakerly, in the year before immunization was begun, eleven nurses developed scarlet fever, one with fatal results; since then—June, 1926—there have been only three cases. These three nurses were amongst the first immunized; they had severe reactions and further injections were not given, but the author and his colleagues have found by experience that individuals having severe reactions are very sensitive to the disease and their immunization should be pushed gradually. However, the individuals who developed the disease showed "a sudden and dramatic improvement" about the third or fourth day.

In 1927 Dr. Stallybrass began the examination of children in institutes and inoculated the susceptible by giving, at weekly intervals, three injections of toxin, the doses being first 500 skin test units, then 1,250 and finally 5,000.

In one institution there has been no definite case of scarlet fever in the last four and a half years, although from 1929 to 1930 the disease was prevalent in the city. In a second institution twelve cases occurred in November, 1928, among children under 5 years of age; immunization of the children in this age-group was begun, one case appeared a month later and since then there has been only one case each year. Two cases occurred in February, 1929, in children between 5 and 7 years old; this group was at once inoculated, two cases occurred in the following month and only one further case in 1930. Cases were occurring among the children over 7, and this age-group was immunized in May, 1929, since when there have been only two cases. The author says that the children admitted to this institution have not been immunized regularly, but although several of the newly-admitted children developed scarlet fever, none of the inoculated children, nor those who were Dick-negative, have developed the disease.

In the third institution, which receives illegitimate children under 3 years of age, many being marasmic sucklings, ten cases of scarlet fever appeared between the beginning of November, 1928, and the end of January, 1929; in the latter month immunization was begun. Only one case occurred in 1929, and none since then. The author does not state the number of immates in these institutions.

The next institution considered was a county hospital for children where the number of beds rose from 90 in 1911 to 212 in 1930. The amount of scarlet fever in this hospital had been very small up to 1926, being about 3·7 cases per 100 beds, except in 1914, 1918 and 1925 when it was higher, but the actual figures are not given.

However, in 1928 the number rose to 54 cases per 100 beds, and in the first half of 1929 falling to 38, but rising to 45·6 in July. Dick-testing was begun, and in August, 1929, non-immunes among the staff and patients were inoculated. One case of scarlet fever occurred in the month of August, and later in the autumn there were 5 cases, 1 of which was only

partially immunized, 2 were Dick-negative, 2 were doubtful cases, and 1 was admitted in the incubation period of the disease. During this period scarlet fever was prevalent in the city. From thirty to forty children were admitted monthly to this institution. Immunization has been continued, and in 1930 there was only one case of scarlet fever and two in 1931. Children pass rapidly through this hospital, and from the success achieved in preventing scarlet fever the writer does not agree with Drs. Glover and Griffith in their statement that active immunization takes too long to be of value in school outbreaks and that it is too uncertain.

He recommends active immunizing in school outbreaks and gives an account of his experience in a boys' school, where several cases occurred in 1927. This was a preparatory school for boys under 14 years of age; 47 boys were tested and 43 (94 per cent) were found to be Dick-positive; of the 3 Dick-negative boys one had already had scarlet fever, one had escaped the disease when others of his family had it, and the third was suffering from otorrhœa, suggested to be of a scarlatinal nature. The Dick-positive boys were immunized and the disease disappeared.

In an industrial school in the same neighbourhood as the preparatory school, an outbreak of scarlet fever occurred four months earlier than in the latter school; the boys were tested, and only fifteen out of 104 were found to be Dick-positive. No immunizing was done and the outbreak rapidly subsided.

After the above experiences the author extended immunization against scarlet fever, the injections being given usually at the same time as diphtheria toxoid, the immunizing substances being in separate syringes, but only one needle being used for each child. Also the dose of scarlet fever toxin was raised from 16,000 to 26,000 skin doses by the administration of a fourth injection of from 10,000 to 20,000 skin doses.

Children in Liverpool are now immunized at a special clinic to which they are sent from schools and from infant welfare centres. Children under 7 years of age are immunized without being tested, but older children are only immunized against scarlet fever and diphtheria if the Dick and Schick tests are positive. Also, children in the Liverpool Day Nurseries are immunized against these diseases unless immunization is refused, which is not often the case. Immunization against scarlet fever of children admitted to hospital with diphtheria is being carried out more and more.

The Health Committee of Liverpool supplies inoculation material free to medical practitioners.

The author points out that the numbers of the general population in Liverpool who have been inoculated are as yet too small to show any effect on the incidence of the disease. He also emphasizes the fact that in scarlet fever, as in diphtheria, cases are most numerous in children under 5 years of age, and that this is the period where immunization is best tolerated, the reactions being minimal, so attention should be concentrated on these children.

SANDERS, J. P. **Treatment of a Patient with Malaria and Acquired Anaphylactoid Reaction to Quinine. Successful Use of Quinidine.** *Journ. Amer. Med. Assoc.* 1931, xcvii, 850.

The writer reports the case of a woman, aged 48, in whom the administration of quinine caused severe reactions, urticaria, vomiting and dyspnœa. In her earlier years she tolerated the drug, but became sensitive when about 20 years old. For several years she was given sodium cacodylate intramuscularly for the relief of malaria.

In 1928 the writer gave her a "cold capsule" containing one-eighth grain of quinine, and in a few minutes there appeared urticaria, dyspnœa, pruritus, nausea and vomiting, which ceased when the medicine was vomited.

In 1930 an attack of malaria was treated with plasmoquin tablets and injections of neo-arsphenamine. Plasmoquin compound was tried, but produced a severe reaction.

The patient was seen again in 1930 with malaria. A skin test for sensitiveness to quinine was positive, while a similar test with quinidine was negative. The patient was then treated with quinidine sulphate—first a trial dose of five grains, then ten grains daily for four days. There were no further clinical signs of the disease, and weekly blood-smears were negative till the end of March, 1931, when benign tertian parasites were again found, suggested to be a new infection. There were no clinical symptoms, but quinidine was again given for four days, since when no parasites have been found and there have been no clinical signs.

Baker, C. E. **Microscopic Examination for Intestinal Parasites of Seventy-three Boys in the National Training School for Boys, Washington. D.C.** *Public Health Reports of the United States Public Health Service.* 1931, xlvi, 2980.

Examination showed that fifty-six of seventy-three boys examined harboured Rhizopoda, Flagellata, Cestoda or Nematoda, some having a single infection, others double, triple, and so on, up to one boy who had six varieties of parasites, namely *Entamœba coli*, *E. histolytica*, *Endolimax nana*, *Necator americanus*, *Trichuris trichiura* and *Strongyloides stercoralis*.

As the sanitation of the school was good, it was considered that infection was probably being carried by infected food handlers. Scrapings from under the finger-nails of forty-seven boys were examined and, although the boys had cleaned their nails before being seen, an *Entamœba* cyst was found in the case of a boy who was known to be infected with *E. histolytica* and *E. coli*. The writer does not state whether the cyst found was of *E. coli* or *E. histolytica*, but it was probably *E. histolytica*, as it is stated in the summary of the paper that "For the first time, as far as we know, an *Entamœba* cyst has been found under the nail of a boy infected with *E. histolytica*. Thus the demonstration is given of what many persons have assumed with good reason to occur."

The boy was employed in the kitchen of the officers' mess.

DAWSON, W. T., and NEWMAN, S. P. **Acquired Allergic Coryzal Reaction to Quinine but not to Quinidine or Quitenine.** *Journ. Amer. Med. Assoc.* 1931, xcvii, 930.

One of the writers (S. P. N.), a male, aged 24, who when a boy was able to tolerate quinine given for malaria, became sensitive to the drug when he was between 16 and 23 years old. He discovered in 1929, while he was making pharmacological tests of quinine, that when he took by the mouth 100 to 300 mg. of quinine hydrochloride, he reacted by developing an itching of the conjunctiva and of the mucous membrane of the mouth, which began about fifty minutes after taking the drug. Then the irritation extended into the sinuses and middle ear; there was profuse nasal discharge, and the voice became hoarse and the eyes bloodshot. In about an hour the condition passed off, and some relief was obtained by the use of atropine.

Attempted desensitizing by giving a capsule containing quinine hydrochloride and 500 mg. of sodium bicarbonate was only successful with a dose of 5 mg. quinine hydrochloride, but failed ninety minutes later when the dose of quinine was 100 mg.

Then quitenine was tested—this is an alkaloid in which the vinyl ($CH:CH_2$) side chain of quinine is oxidized to carboxyl (COOH)—but a preliminary dose of 10 mg. of quitenine did not protect against 325 mg. of quinine hydrochloride, though 300 mg. of quitenine caused no reaction.

In 1930, in one month he took twenty-one doses, each of 650 mg. of quinidine sulphate, with no signs of intolerance.

Tests were first made with small doses of quinidine, and he was found to be tolerant of this drug, while a small dose of quinine caused a reaction, although when a solution of quinine was applied to scratches on the skin wheals did not appear.

A brother of S. P. N., tolerant of quinine until he was about 21 years of age, then developed urticaria when the drug was administered.

The authors were able to find only one previous record of a coryzal reaction to quinine.

The work was carried out in the Medical School of the University of Texas.

Reviews.

THE PRACTICAL TREATMENT OF DIABETES. By T. Izod Bennett, M.D., F.R.C.P. London: Constable and Co., Ltd. 1931. Pp. ix + 107. 6s. net.

This little volume will be found very useful by any physician in charge of a case of diabetes, especially as it is one that can be put with safety into the hands of the patient of average intelligence, who will add much to his comfort by following the advice given in its pages.

It is not marred by too much theory; only enough is enunciated to

enable the patient to understand the reasons for the various procedures recommended and to encourage his co-operation therein. The directions regarding dietary, urine testing and insulin administration are more than usually lucid and practical. The importance of having the patient satisfied with his diet is emphasized; the only comment that the author considers can reasonably be made on the high carbohydrate and low fat diet is that it is a difficult diet to make palatable unless the fat is high enough for obesity to be a menace.

As an appendix, extracts from the food analyses given in Dr. R. D. Lawrence's "The Diabetic Life" add to the value of the book.

THE THYROID AND MANGANESE TREATMENT: Its History, Progress and Possibilities. By Herbert W. Knott, M.R.C.S., L.R.C.P. London: William Heinemann (Medical Books), Ltd. 1931. Pp. xv + 265. 7s. 6d. net.

It is six years now since Dr. Knott first brought to the notice of the profession his method of treatment by thyroid and potassium permanganate. In the interval it has been given a trial by many practitioners, especially in pneumonia.

The present volume is a history of the events leading up to his discovery of the method and of the progress made since then. The author's enthusiastic belief in his treatment is unbounded, and the reports received from others are so good that those who read the book will find themselves compelled to give it a trial, if they are not already disciples of Dr. Knott. The diseases treated successfully are extremely varied and the results equally dramatic in most cases. The methods of applying the remedies are described in detail.

We feel that when another edition of the book is called for, it would make more easy reading if it were cut down considerably; there is a good deal of the unnecessary and of repetition in the present volume.

THE COMMONER NERVOUS DISEASES. By Frederick J. Nattrass, M.D., F.R.C.P. London: Humphrey Milford, Oxford University Press. 1931. Pp. 218. 2 coloured plates and 15 figs. 12s. 6d. net.

In this volume the author has aimed at and succeeded admirably in giving the fundamental information about the commoner nervous diseases required by the general practitioner, holding that difficulties in diagnosis arise more often from lack of knowledge of the vagaries of common diseases than from unfamiliarity with rare ones.

In its twenty chapters, we have described to us in an arresting manner, with abundance of clinical examples, the ætiology, symptoms and treatment of the conditions we are most likely to meet in everyday life; unusual conditions are not referred to. Apart from the coloured plates which depict optic atrophy and papillœdema and two anatomical diagrams, the figures are not of much value to the book and might have been dispensed

with. This is the only point we can criticize adversely in a book that we hope will afford as much pleasure and profit to others as we have had from it. We can recommend its purchase for every hospital library; better still, by everyone dealing with medical cases.

HANDBOOK OF SANITARY LAW. By B. Burnett Ham, M.D., D.P.H.Camb. London: H. K. Lewis and Co., Ltd. 1931. Pp. xxxi + 366. Fcap. 8vo. Price 7s. 6d. net.

The eleventh edition of the "Handbook of Sanitary Law," by Dr. B. Burnett Ham, has been brought up to date. Although intended mainly for students desirous of taking the Diploma of Public Health, it will also be useful for reference by Medical Officers of Health.

The characteristic simplicity and conciseness of earlier editions have been preserved, and the present edition is eminently suitable for its purpose. The subject matter has been clearly arranged and the book is of portable size.

Correspondence.

LONDON WATER SUPPLY.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—(1) The editorial on the London Water Supply appearing in the December, 1931, number of the Journal contains certain statements regarding the action of ammonia chlorine compounds which appear to merit amplification.

This subject has been dealt with at length in various communications to this Journal, and also in a paper read before the Centenary Congress of the Royal Institute of Public Health, held at Brighton in 1925. In the early days the interpolation of very necessary supporting experimental data undoubtedly detracted from the clarity of the various conclusions, and as the routine employment of these compounds is now gaining ground, perhaps a few explanatory remarks may not be out of place.

(2) The original experiments with chlorine and ammonia chlorine compounds were especially designed to test their comparative value in the treatment of all possible casual water supplies which might be encountered by armies in the field, ranging in type from the lightly contaminated, relatively pure well to the village tank of the far-off frontiers. The consideration of the latter type of supply, which would not normally come within the purview of civil practice, is necessary in the Army, since the success of a military operation might easily depend upon the temporary utilization of such a source of supply.

(3) In grossly polluted water it appeared that the action of chlorine

was seriously hampered, probably owing to the combination of chlorine with albuminoids, etc.; on the other hand, ammonia chlorine compounds proved more efficient, both from the point of view of germicidal velocity and persistence. This is of interest when it is considered that in early experiments with simple chloramines, colloids (glue) were associated with their preparation. Slight increases in the temperature of the water under treatment, such as might be met with abroad, favourably affected the germicidal velocity both of chlorine and ammonia chlorine compounds, but in the case of chlorine, absorption or deviation was disproportionately increased and its inferiority became more obvious.

(4) In relatively pure water chlorine exhibited its usual rapid germicidal effect, but with slightly increased temperatures the germicidal velocity of ammonia chlorine compounds approximated very closely to that of chlorine.

(5) Those of us who are acquainted with the records of water-borne disease on the Indian frontiers, and the habits of Indian races, will appreciate that any method of purification adopted for field service must prove capable of standing up to an unexpected load of human pollution.

After the foregoing findings were confirmed further tests with specially polluted samples of water were carried out. These tests proved that when employing bulk dosing of the supply with ammonia followed by chlorination, failures were experienced owing to the fact that inimical substances in the water sample occasionally caused deviation of the chlorine before it could enter into combination with the ammonia. This loss could be mitigated by super-dosing with ammonia, but this conservation was associated with a very prolonged germicidal lag which indicated that the activity of chlorine had been completely immobilized.

(6) Chloramine ("pre-formed") made by the interaction of chlorine and ammonia in optimum concentration and added to the test samples gave constant results and no failures were experienced. It also appeared that the germicidal velocity of chloramine ("pre-formed") was higher than that obtained by bulk dosing with ammonia followed by chlorine.

(7) Chloramine ("pre-formed"), both mono- and di-chloramine groupings, gave good results on all occasions, but those obtained with the mono-chloramine group were of a more even character, and this group also proved superior from the point of view of resistance to higher temperatures and persistence in water.

(8) The final conclusion arrived at was that the chloramine ("pre-formed") of the mono-chloramine type was the purification agent of election for field service.

I am, Sir,
Your obedient servant,

Salisbury,
December, 1931.

C. H. H. Harold,
Major, R.A.M.C.

EDITORIAL NOTICES.

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Journal

of the

Royal Army Medical Corps.

Original Communications.

THE ARMY MEDICAL SERVICE IN WAR.[1]

BY MAJOR GORDON WILSON, O.B.E., M.C.,
Royal Army Medical Corps.

IT has been my privilege during the past two years to come into contact with many of the younger fighting and administrative officers who are closely associated with the current reorganization of the Army. This contact has brought with it a very clear appreciation of the spirit of co-operation that now links the fighting and administrative branches. It is with this spirit of co-operation in mind that I have framed the following remarks on the Medical Service. The consideration of this Service in war, however, is so closely bound up with its peace-time activities that we must first summarize its peace-time functions.

The regular Medical Service of the Army at present has an establishment of approximately 850 officers and 3,600 other ranks of the Royal Army Medical Corps. Prior to the outbreak of war in 1914, it consisted of 937 officers and 3,760 other ranks, but in those days no other ranks of the Royal Army Medical Corps were employed in India. It is clear, therefore, that there has been a reduction in establishment as a natural corollary to the reduction in other arms and branches of the Service. In addition to the officers and other ranks of the Royal Army Medical Corps, there are the ladies of the Queen Alexandra's Imperial Military Nursing Service

[1] A paper read before the Royal United Service Institution on November 4, 1931, and reprinted by kind permission.

and the officers and other ranks of the Army Dental Corps, formed since the war.

The general duties of the Medical Service of the Army in peace time are:—

(1) The prevention of disease.

(2) The professional care and treatment of the sick and injured.

It is not proposed to recapitulate at length any existing regulations, but it is necessary to refer briefly to the main duties with which the officers of the Medical Service are charged. These are:—

(i) The duty of recommending to general and other commanding officers precautionary and remedial measures on all matters which may in the opinion of the medical branch conduce to the preservation of the health of the troops and the mitigation or prevention of disease in the Army.

(ii) The professional treatment and care of the sick and injured, the administration of military hospitals, the provision and replenishment of medical equipment and the preparation of medical statistics.

(iii) The command of all patients in military hospitals or in quarters on the sick list, of medical units and establishments, and of such officers and soldiers as may be attached thereto.

(iv) The training of the Royal Army Medical Corps.

(v) Certain duties relevant to the determination of the physical fitness of candidates for commissions in the Army, of recruits and others.

Although the present peace establishment of the Royal Army Medical Corps bears no definite relationship to the requirements of an Expeditionary Force, it would be idle to suggest that it does not form a vital nucleus for the Medical Service of the Army in war. It is an establishment calculated virtually on a "one man one job basis" according to the needs of our home and overseas garrisons. The Medical Service is, therefore, a purely peace-time organization functioning in units not organized for war. I shall refer to this statement when dealing with preparation for war. Professionally the Medical Service has had to keep pace with the high degree of specialism which has entered into the practice of medicine. Specialism is a feature of modern development and is evident in all branches of life. This increase of specialism in the Medical Service has not been restricted to the officer branch, but has had its repercussion amongst the other ranks personnel of the Royal Army Medical Corps, a considerable percentage of whom now require to be trained in such special subjects as X-rays, laboratory work, massage, etc., and for whom, when qualified, special tradesmen's grades are recognized for the purposes of pay. Specialism has resulted in increased expenditure on the necessary equipment and its upkeep, as well as on special accommodation, but at the same time there has been a greater centralization of military hospitals and the abolition as far as possible of outlying establishments.

As regards professional training, young medical men entering the Service undergo a course of training at the Royal Army Medical College,

at Millbank, in which special instruction is given in such subjects as Military Hygiene, Military Surgery, Tropical Medicine, Bacteriology, Recruiting Duties. This course lasts three months, subsequent to which these officers undergo a further period of instruction for two months at the R.A.M.C. Depot and Training Establishment at Aldershot. Here instruction assumes a more military aspect and serves as an introduction of the young medical officer to military life. Special attention is directed to the conditions of the soldier's life, his food, clothing, discipline, etc. Instruction is given in physical training, drill and equitation, and particular attention is directed to practical military hygiene.

Officers, who have served (one tour) abroad and have a total service of between seven and twelve years, attend a senior Course of Instruction at the Royal Army Medical College. This course, which lasts five months, is a most comprehensive refresher course in professional work—what in civil life would be designated a post-graduate course—and it involves amongst other things attendance for clinical instruction at some of the great London hospitals. Officers who pass this course with distinction are permitted to specialize for a further period of four to five months in purely professional subjects, and during this period of study frequently acquire additional medical degrees.

Royal Army Medical Corps other ranks on enlistment undergo six months' training at the R.A.M.C. Depot and Training Establishment at Aldershot. The atmosphere of training in the R.A.M.C. Depot is comparable with that obtaining in any regimental depot, with the exception, of course, that the technical duties differ.

As regards the prevention of disease in the Army—which is a primary function of the Medical Service—it must be admitted that a high standard of efficiency has been reached, and by virtue of the co-operation of all ranks it has been possible to maintain this standard in peace time with the minimum of machinery for the purpose. This state of affairs has only been achieved by a very continuous policy in the training of Army medical officers in the profound importance of military hygiene and by the spread of knowledge to officers and other ranks throughout the Army, who now have a much wider appreciation of the causes and prevention of disease.

The professional care of sick and injured in peace time, I may say, is a function that will always have a strong personal aspect, and for this very reason is provocative of criticism. I will only remark at this stage that the enlisted soldier, whether on duty or furlough, is *entitled* to medical attendance and admission to hospital when necessary, at the public expense. Not so the officer, whose only degree of entitlement is admission to hospital subject to his disability being attributable to military service. All other treatment afforded to the officer, whether in quarters or in hospital, is in the nature of a privilege.

To refer to the subject of criticism of medical treatment, the officers of

the Medical Service are well aware that "it is human nature to criticize one's doctor and nothing on earth will alter it." Most medical officers being but human themselves prefer such criticism to be constructive. Summarized briefly the Medical Service of the Army has undergone very considerable reorganization since the termination of the Great War. There has been a close scrutiny of all hospital establishments, not alone with a view to reduction in officers and other ranks, but with a view to more economical administration. Many small military hospitals have been abolished, and as far as possible centralization in the larger military hospitals has been exploited. The average number of unoccupied equipped beds in military hospitals is under constant review, and any increase over what is estimated to be a reasonable margin for emergencies is immediately readjusted.

The chief features regarding treatment have been the increase in specialist departments and the very valuable addition to our larger hospitals of out-patient departments, where specialist advice and treatment can be obtained and special examinations carried out without necessitating admission to hospital. These specialist departments are very fully used; the modern soldier being better educated and more fully alive to the amenities of civil hospital organizations, expects and receives a standard of treatment far higher than that which has obtained in the past. This is the outcome of civil progress. Officers and other ranks of the Royal Army Medical Corps are very fully employed, and it must be remembered that training of the other ranks R.A.M.C. in the many highly technical trades of the Corps throws an additional burden on the officers of the R.A.M.C. and the ladies of the Q.A.I.M.N.S.—a fact which is not always remembered by outside observers.

Let us now consider the functions of the Medical Service of the Army in war. In Field Service Regulations, Vol. I, Section 68, we find generalizations on the maintenance of health and the maintenance of fighting strength of units. We read that it is the duty of the Medical Service to advise commanders, who are responsible. We go further and find definite responsibilities allotted to the Medical Service for:—

(i) The collection, professional care and treatment of the sick and wounded in the theatre of operations and for their evacuation.

(ii) Advice to commanders with regard to the location of medical units.

(iii) The supply and replenishment of all medical equipment.

This is the section of Field Service Regulations which is indexed to define our responsibilities, and it is remarkable for two striking omissions.

Firstly, there is no clear and unequivocal statement that the regular organization of the Medical Service is inadequate to fulfil its function in the field in any but lesser engagements. There is no statement that a supplementary organization must be employed to meet heavier demands, and that this supplementary organization is agreed to in principle and is

the responsibility of the commander to provide. The ordinary individual reading this section for information assumes that the Medical Services are fully equipped to carry out their duties under all conditions. It is only by careful scrutiny of Field Service Regulations that we find the references which admit the necessity of this additional organization. Who can review the limited capacity of our field medical units, for example, without realizing that the resources of personnel, equipment, and transport require supplementing in the stress of a campaign of any magnitude. These additional requirements are provided by other services or departments when authorized by the staff, and it is evident that there must be close co-operation between the staff and administrative services if the medical organization is to function efficiently. Would it not be better to enunciate more clearly in Section 68 the existence of this divided responsibility—so that the attention of all involved might be directed in peace to this system of co-operation which is essential in war.

The second omission in Section 68 is the absence of reference to the underlying object of the Medical Service in war—namely, the conservation of man-power. There is no service in the Army with the like responsibilities of the Medical Service in attaining this object. It may be said that this object underlies the organization of the Army as a whole and is in the province of a commander. There is the familiar statement in Field Service Regulations, Vol. I, Section 1, para. 1, which indicates the necessity for the minimum expenditure of time, men, material and money in the furtherance of the approved plan of campaign. Nevertheless, the capacities of an efficient Medical Service to conserve man-power are only being fully realized in the light of experiences of the Great War. The price of a campaign is dependent on Government policy and in his turn a commander presumably fixes a price he is prepared to pay in the attainment of any particular object. His decision cannot fail to be influenced if he knows that he has an efficient organization for the sole purpose of conservation of man-power for future use. With the enunciation of this principle of conservation of man-power as the definite object of the Medical Service in war, we gain a greater sense of proportion as to its functions.

For generations the Medical Service in war has been regarded in the lay mind as a sympathetic organization, a gesture towards the alleviation of the sufferings of war. It would almost appear that this sympathetic conception has, owing to lack of a wider outlook, been unconsciously exploited by Governments and Army authorities in the past with a lively expectation of assistance to come from sources other than the Treasury.

These experiences have shown that an efficient Medical Service, by the prevention of disease, the expeditious evacuation of casualties to suitable well-equipped accommodation, improved methods of treatment, the reduction of the period spent in hospitals for sickness or wounds, and a greater knowledge of war stress and strain on the individual, can not only assist in maintaining a high standard of morale, but can influence profoundly the

problems of man-power and reinforcements which are the concern of higher authority. In addition, the information which is gained in the performance of these services can be translated to the uses of the General Staff, and may be of inestimable value in gauging the man-power of an enemy at various stages of a campaign. The personnel of the Medical Service in war will always retain their sympathetic ideals in the performance of their functions; but in the light of modern knowledge the medical organization should be regarded as a scientific weapon placed in the hands of a commander for the furtherance of victory.

Peace-time Preparation for War.

Under the conditions which have arisen since the war the medical officers of the Army are so fully engaged in their professional duties that they have little opportunity of studying the wider problems of the Medical Service in war. As already stated they work in units which are not organized for war. To begin with, field training of the Medical Service is to all intents and purposes non-existent. Officers occasionally attend staff exercises and what are termed medical staff exercises, the latter being based on schemes which have been approved by the Staff, while an officer with A. and Q. experience is usually made available for assistance in their direction. These exercises are limited in number and produce a temporary stimulation of interest in the problems of the Medical Service in war, but such stimulation rapidly dies down with the press of purely professional work, so that medical officers find it well-nigh impossible to keep in the stream of current thought and advance in military and military-medical matters. There is no field training of the medical units employed in war, so that neither officers nor other ranks get the outlook of active service. It is true that a certain number of medical officers attend manœuvres for attachment to regimental units, but here again the ordinary professional duties involved by the medical charge of several units allow little opportunity to watch and gain information of the tactical employment of such units, although a general knowledge of these matters is essential for intelligent field medical work in forward areas.

These restrictions are doubtless due in a measure to economic factors, the cogency of which is fully appreciated by the Medical Service, but they emphasize very clearly the situation which will inevitably arise, when medical officers accustomed to an immobile and peace-time outlook will be translated to the mobile, perhaps highly mobile, conditions of war. It pre-supposes a power of adaptation beyond anything which is expected of other branches of the Army, and it is an undoubted fact that when this situation does arise, a high degree of efficiency is expected. Until recently other ranks of the R.A.M.C. have been largely composed of men serving on a 3 and 9-year engagement, and it gives food for thought that thousands of these have passed to the Reserve without ever having seen a field medical unit.

The only officers in the Medical Service who are in the position to devote time and study to the problems of the Medical Service in war are those who are engaged in certain administrative duties, and who by virtue of their appointments are in closer touch with the military organization. The number of these officers is small and as a rule they are the older men, who even with the best will in the world may not be available for a future war.

No account of the preparation of the Medical Service for war can be instructive without some reference to the assistance which we all have reason to hope will become available in war. As mobilization is not under discussion, reference is only made to assistance from voluntary sources. We have no reason to suppose that when a future war of any magnitude develops, the medical profession, a large number of whom are already serving in the Territorial Army, will not, as in past wars, provide many officers. Some of these we hope will be in possession of certificate B (Medical) of the Officers Training Corps. It is not too optimistic to conjecture that there will be no dearth of highly trained physicians and surgeons. On a voluntary basis the period after the declaration of war at which these officers would become available, would depend to some extent on their private commitments at the time of the outbreak of war and to some extent on public feeling as regards the policy of the war.

The most important assistance in the form of other ranks arranged for in peace time is the Military Hospitals Reserve, which is raised by that great organization the St. John Ambulance Brigade and by the St. Andrew's Ambulance Corps. This Reserve, which consists of carefully chosen men highly trained in first aid, ambulance duties and elementary nursing, replaces in our military hospitals at home R.A.M.C. other ranks, required for field duties. The value of this reserve was proved in the Great War.

An additional source of voluntary assistance is that which is authorized in the scheme for Voluntary Aid Detachments. The detachments are organized to supplement the medical services of the forces of the Crown in the event of general mobilization which involves the embodiment of the Territorial Army. It is stated in the scheme "that the Medical Services of the forces of the Crown are sufficient to meet ordinary peace requirements but they lack certain reserves on general mobilization and possibly also on partial mobilization, and therefore these services may require the assistance of detachments." The V.A.D. Council which administers these detachments in peace time is a highly representative Council set up and constituted by the Army Council.

The detachments are trained and maintained with the specific object of providing personnel for assistance mainly in distributing zones. Women's detachments greatly exceed those of men. The organization contains a considerable number of "mobile" members who would be available for service abroad.

Material assistance to the Medical Service in the course of peace-time

preparation for war does not arise. It develops during war proportionately to the public sympathy which is aroused. It requires skilful direction and may assume colossal proportions, as in the Great War. Its value cannot be described in words; it is inestimable. Except however where it takes the form of transport it has only a modified influence on the pivotal problems of the collecting and evacuating zones.

Medical Conditions in a Future War.

Current opinion points to the probability that in a future war the Army will be composed of formations similar to those employed in the past. It will, we are told, be smaller—at least in the initial stages of a war—more mobile and more efficient, and it will have armoured formations and units possessing a high degree of mobility. It will, in addition, have the assistance of a more highly efficient air arm.

The advance in mechanization, which is necessary to produce the additional mobility and the greater use of mechanical weapons, draws immediate attention to the controlling factor, man. The Army will contain a large percentage of fighting mechanics. Longer service will be required to obtain the high degree of specialism necessary for efficiency.

Prevention of wastage in war will assume greater importance than ever before, and the demands on industrial mobilization to maintain mechanical efficiency in the field will have a close bearing on the problem. There is world-wide evidence of the power of adaptation of man to the machine.

In the Army general attention has been directed to the change which mechanization is likely to produce in the soldiers' mentality, and some particular attention has been given to the occupational effect of life in certain highly mechanized units. From the evidence obtainable it appears that the healthy soldier can adapt himself in a remarkable fashion to the stress and strain involved in the handling of highly mechanized weapons in *peace time*. It must be admitted, however, that the speeding up of mental and physical processes under the conditions imposed by certain modern machines of war must result in some cumulative strain. What additional effect actual conditions of war will have on this problem has yet to be experienced. It may depend on psychological rather than on physical reactions.

The use of tanks and armoured cars presents a new problem in the collection and evacuation of casualties. This question is, for obvious reasons, unsolved; armoured formations are still in a highly experimental stage and war alone can bring the real solution. It is interesting, however, to speculate on this problem and review our present ideas. Generally speaking, the collection of casualties from armoured formations represents a similar problem to that of collection of casualties from cavalry formations. The cavalry field ambulance which is mechanized and highly mobile requires a brief description. It contains a headquarters which is capable of forming a main dressing station, and four small but highly mobile

sections. Each of these sections consists of a light lorry to carry medical equipment and personnel, a medical officer in a light car and a motor cyclist for purposes of intercommunication. Each section is capable of forming an advanced dressing station, where wounded are collected from regimental aid posts or points indicated by the regimental medical officer. Evacuation to the main dressing station is carried out by motor ambulance cars allotted as necessary to each section. There are twelve 6-wheeled motor ambulance cars with the headquarters of a cavalry field ambulance for this purpose and a small reserve of stretcher-bearers. The successful employment of this unit with cavalry is dependent on the maintenance of close touch between regimental medical officers and these highly mobile sections which must be pushed well forward. Cavalry field ambulances are provided on a basis of one per cavalry brigade.

Here then we have a unit which by virtue of its mobility and organization is theoretically suitable for employment with highly mobile formations. Casualties in tanks, however, cannot be removed while the tanks are in action, and agreement is yet to be reached as to when and where the most practicable opportunity of doing so presents itself. Let us consider a tank battalion taking part in an independent attack by a tank brigade. We will suppose the battalion is advancing in bounds on a frontage of 800 to 1,000 yards. Each company is given a definite objective for each bound, and will presumably rally after each attack before proceeding to the next objective. Is it possible to remove wounded when these rallies take place? It may be so if a rally is protected by smoke and time is available. Failing this, wounded in tanks will have to remain there as long as the tanks are in action, and any removal of the serious cases will require to take place at the first possible opportunity that medical assistance can be made available after withdrawal of tanks from action. This will necessitate the pushing up of medical vehicles and personnel as rapidly as military considerations will permit. The rapidity of bringing medical assistance to tank casualties will depend on the nature of the ground over which the tanks have passed, the degree of clearance of the enemy which has been effected, and on other factors peculiar to each action.

Under present arrangements a mechanized field ambulance would accompany "B" echelon of an armoured brigade, from which we may infer that wounded cleared from the battlefield would be diverted to a main dressing station formed by the headquarters of the ambulance at that locality where "B" echelon join "A" echelon after the conclusion of an action. Evacuation of casualties from this main dressing station to the casualty clearing station would be carried out by motor ambulance convoy, making full use of protection afforded to supply columns of the formation. When armoured brigades are operating with cavalry and infantry, and particularly in those situations where objectives secured by tanks are rapidly occupied by other arms, it would seem advisable for tanks to seize every opportunity of shedding casualties as occasion permits. Medical assistance in these cases will be more rapidly available.

Casualties occurring amongst armoured car personnel present difficulties on occasion, particularly during long distance reconnaissance. In this latter case, it may not be possible to obtain assistance from the nearest medical unit in time to extricate casualties; neither may the chances of retrieving wounded justify the despatch of motor ambulance cars and personnel long distances without a reasonable prospect of success. Nevertheless armoured car units must rely on the nearest medical units for evacuation of casualties, and success in their removal will depend largely on accurate information and the least loss of time in intercommunication. Normally, motor ambulance cars will not be detailed to armoured car regiments, but it is easy to conceive situations where such units will require to be self-contained.

Under certain circumstances seriously wounded in armoured cars will have to be left in enemy or disputed country, provided reasonable comfort and attention are assured, but generally speaking, in the immediate absence of medical transport, the tendency will be to retain wounded in armoured cars until they can be removed in the normal way. First-aid equipment is provided in both tank and armoured car, and the percentage of men trained to utilize it is somewhat higher than in other fighting units. But whereas the medical officer of an armoured car regiment is situated so that he can be of some assistance in action, the medical officer of a tank battalion is relegated to "B" echelon. Whether the future development of the tank arm will necessitate the carriage of unit medical officers in armoured vehicles with some small accommodation is a controversial point. What is perhaps still more controversial is the view taken by some that a percentage of the ambulance cars of the mechanized field ambulance should be armoured.

In the consideration of armoured formations there is a striking analogy between the tasks and organization of the Medical Service and those of the Royal Army Ordnance Corps. Unfortunately, the medical "recovery" problem has not been solved, and spare parts for the human machine cannot be carried with a unit. Maintenance of morale underlies the whole question of removal of wounded from armoured formations.

Field Medical Organization to meet New Conditions.

Knowing the dangers of prophecy, the consideration of the field medical organization to meet new conditions of a future war can only be undertaken on broad lines. Details of organization will develop in peace time according to the reorganization of the Army as a whole. We can, however, broadly outline what the effect of the increased mobility of the Army as a whole will be on medical arrangements. The general problem of prevention of disease remains unaltered. We can enter upon no future war with any degree of confidence unless the medical organization for the prevention of disease is in a high state of efficiency. Preparation for war will involve the very closest consideration of all factors likely to influence the health of troops,

and it will be possible in the light of modern knowledge and recorded experience to estimate with greater accuracy than ever before the wastage which may be expected from endemic and epidemic disease. This will enable truer forecasts of the material and accommodation to be made and will give greater confidence to other branches of the Army in framing their plans for the maintenance of a force in the field. It is fortunate for the Army that the peace-time Medical Service provides a special organization for the prevention of disease. This organization is at present our greatest preparation for war. Its necessity was slow to be recognized in the past, but its permanency is now assured on its merits.

Associated with the hygiene branch of the Medical Service in the prevention of disease is the pathology branch, whose successes in the realm of protective inoculation constitute a first line of defence in the field which no commander can afford to ignore.

The field medical organization for the collection, evacuation and accommodation of casualties under conditions of greater mobility in a future war will necessitate a progressive review of our medical establishments. Advanced dressing stations and main dressing stations will require to be more mobile. They will be opened and closed with greater frequency. Our first gesture towards this necessity is in the present cavalry field ambulance, which is completely mechanized, and there is every indication that the field ambulance for employment with infantry divisions may in its turn assume a somewhat similar organization. At present it contains horsed and mechanical transport, but its personnel march on foot. Side by side with the motor ambulance car we see the horsed ambulance wagon, a relic of the past which still receives the commendation of some authorities. Yet in view of modern developments it is hard to conceive where the horsed wagon can function more efficiently than the mechanical. There is, however, no doubt that the horsed wagon has its adherents, particularly if a light wagon is employed.

If the field ambulance is mechanized it will require complete reorganization, and it is the view of many that the personnel should be carried in vehicles on the line of march. During the more static conditions of war this additional transport might be absorbed in a mechanical transport reserve. War establishments of field ambulances since the war have shown a decided tendency to reduce the number of stretcher-bearers, and this is in keeping with the policy of reducing the "carry" of wounded men by hand by bringing up vehicles as far as possible. The use of a 6-wheeled motor ambulance car capable of cross-country performance supports this theory.

Rapid clearance of wounded from battlefields under more mobile conditions of war can only be achieved by ample ambulance transport, and if the present field ambulance is mechanized, ambulance cars will be required on a generous scale to meet the requirements of the wider fronts from which evacuation is to take place.

While we may expect advanced dressing stations to be sited further forward than in the past, main dressing stations are likely to be further back, and the distance of casualty clearing stations from main dressing stations will in most cases be considerably increased. The practicability of removing wounded long distances by motor ambulance convoy to casualty clearing stations is undoubted, but it will be expensive in transport and detrimental in many cases to the wounded. Except with formations operating at a long distance from the main body, and with no other means of evacuating wounded, we are unlikely to see carries of more than 50 or 60 miles by motor ambulance car. It is more than probable that a chain of casualty clearing stations will be established and leap-frogging by these will be necessary to meet the changing conditions of operations. To achieve this result satisfactorily the establishment and organization of the casualty clearing station will require drastic review. The casualty clearing station as it stands is a notoriously immobile unit and is the bugbear of all staff exercises of the present in which mobility of the forces engaged is a basic feature. Field Service Regulations indeed visualize the circumstances under which a chain of casualty clearing stations might be necessary; but the present form of stations is definitely not adapted to movement away from rail.

It is at this stage that some reference must be made to the use of aerial ambulance transport. The study of the different types of battle casualties in the Great War shows that there is a fairly constant percentage of casualties whose only hope of recovery is operation at the earliest possible moment under suitable surroundings. The claim of the officer or man to the only hope of recovery will make a demand for this form of transport in a future war.

Aerial transport of casualties is no innovation; it was tried successfully on a large scale as far back as 1923, when the French Army was fighting in Morocco. The officer commanding the French Air Service in Morocco has stated [1] that this method was "neither more dangerous nor more expensive than other modern methods of transport of the sick and wounded. It has the further advantage of enabling commands to evacuate the wounded rapidly to the rear, thus relieving the transport columns and economizing in the protection of these columns. Further, from the technical point of view, it gives greater degree of mobility to columns during operations by freeing them from the necessity of providing transport of wounded and sick." Amongst the theatres of war in which the British Army might be employed there are certainly some in which aerial transport of casualties will economize in road transport and protective troops. In future war we shall see an immediate demand for aerial ambulance transport, particularly in those countries where roads are bad and rail accommodation strictly limited.

Field medical organization must of necessity vary with the theatre of operations, and any alterations in field medical units which are contemplated

in peace must be strictly governed by the necessity for elasticity in war. The experiences of the Great War vastly improved our knowledge of rail, river and sea transport of casualties, so that we can face these problems of a future war with a sound appreciation of past errors in their utilization. What gives the Medical Service most cause for concern is the present high degree of specialization amongst fighting troops. Will there be a margin of personnel and transport which is likely to be made available for supplementary assistance to the Medical Service in times of stress? Failing this margin the collection and evacuation of casualties from forward areas will still be the same stumbling block which has given rise to so many difficulties in the past.

One point about the provision of general hospital accommodation in a theatre of war demands careful attention. In the past it has almost invariably occurred that general hospitals were the last units to be embarked with expeditionary forces. This has resulted either in the immobilization of field medical units which were rendered unavailable for the battle area, or in the unnecessary evacuation from the theatre of war of cases of minor sickness and disability. Serious wastage from a force may thus occur in the initial stages of a campaign. In a future war the loss of highly trained personnel in this way will take an even more serious aspect; it can only be guarded against by arranging for a definite percentage of general hospital and convalescent depot accommodation to be despatched with advance troops.

Co-operation with Other Branches of the Army.

I shall restrict myself mainly to a consideration of the co-operation necessary to ensure the rapid collection, evacuation and accommodation of casualties in the field. Co-operation in the prevention of disease constitutes a problem of its own and presents somewhat different features in that the dangers of disease are constantly being brought home to all in peace. Attention is focused on outbreaks, their causes and prevention. Legislation for the prevention and control of certain diseases is world-wide, and its necessity is admitted. Army officers, as a whole, therefore see the necessity for the rigid attention devoted to the prevention of disease in war. Furthermore, many officers have served abroad and have been brought face to face with the realities of disease and its fulminating possibilities. An outbreak of cholera, for instance, brings about a co-operation which is strengthened by the instinct of self-preservation.

The efficiency of medical arrangements for the collection and evacuation of casualties is vitally dependent on a successful co-operation with other branches of the Army through the medium of the Staff. It is on this co-operation that all hinges. In the past there has been an impression in the public mind, and in the minds of many Army officers, that so long as plenty of good physicians, surgeons and nurses were forthcoming in a theatre of

operations, all would be well. This is typical of the line of thought which conjures up a vision of the doctor's personal function, but overlooks the overwhelming importance of the organization which is necessary to enable him to perform it. The Medical Service may enter a war with the finest professional teams which a country can provide, yet it is of no avail unless there is a smooth system for the collection, rapid evacuation and suitable accommodation of casualties. This is borne out by history and explains in a few words the disasters and misunderstandings which have been laid at the door of the Medical Service in past campaigns.

What, then, is the secret of success? It lies in a greater mutual understanding between the staff and the Medical Service. On the part of the staff it requires appreciation of medical problems and their influence in the successful prosecution of a campaign, in addition to an expert knowledge of the medical organization in the field. On the part of the Medical Service it requires, in addition to professional attainments, a sound knowledge of military organization and of the difficulties of movement and maintenance common to the Army as a whole.

The Medical Service fully realizes that fighting considerations come first of all, and that demands for supplementary assistance have to be considered in the light of their influence on problems of more vital importance in the conduct of operations. Given the necessary information by the staff, an administrative medical officer is in a position to estimate his requirements in any given situation with considerable accuracy. If after careful consideration requirements cannot be provided owing to the exigencies of the Service, there should be recognition of this fact when the additional price of operations throws limelight on the Medical Service.

To illustrate in somewhat further detail the pivotal importance of the collecting and evacuating zones, let me quote to you from the final volume of the Medical History of the War [2]. It will show you the typical circumstances in which the co-operation of which I speak is necessary, and it will at the same time direct your attention to an official publication which is probably the greatest contribution to military medical knowledge which has ever been placed in the hands of an Army. We read:—

"The administrative medical officer of a division or a corps, on being handed an estimate of battle casualties, deducts the numbers likely to be killed and reported missing. He is thus able to form some idea of the numbers for which provision should be made by the respective formations. This figure is roughly divided according to the known percentages in the battle area into walking, sitting or lying-down cases. The percentages vary in every theatre of war and in every battle in the same theatre of war. Until experience is gained, the approximate percentages may be taken as 30 per cent walking and 70 per cent sitting or lying down. By calculating the number of sitting and lying-down cases in this way, and by estimating the distance they must be carried by hand before being transferred to some form of mechanical transport, a working idea is obtained of the additional

accommodation, extra bearer personnel, stretchers and blankets that will be required. At the transfer station, be it advanced dressing station, walking wounded collecting post or main dressing station, the walking cases usually disappear as a group, as from this point onwards all casualties as a rule require conveyance of some sort. Of total casualties sent to casualty clearing stations, approximately 50 per cent require sitting and 50 per cent lying-down accommodation.

If the transport allotted to the Medical Services is considered insufficient to convey the calculated number, additional transport will be required, and either extra motor ambulance convoys or general transport and utility vehicles must be provided. In both circumstances time and warning are necessary if the arrangements are to work smoothly and normal traffic is to be disturbed as little as possible. So far as subordinate formations are concerned, their interest in the estimation of casualties is more or less confined to the preparations for and the carrying out of the collection, early or first-aid treatment and evacuation of the sick and wounded from their area. Not so with the higher formations or headquarters, who are responsible for the further treatment, housing and distribution of casualties. The number of casualty clearing stations allotted, the sites on which they are opened, and the extra personnel and assistance given them will depend on the casualties expected from formations or areas. Like all other military movements, the concentration of medical units requires time and must be conducted with secrecy."

If this statement be considered and added to it the problems of rail and river transport, and the provision on the lines of communication or at the bases of general hospital accommodation for sick and wounded, it will be realized how wide is the field of co-operation which is essential for success if casualties are to be removed expeditiously and to receive skilful treatment under suitable conditions at the earliest possible moment. That such co-operation has been lacking in past campaigns is undoubted, and we have a classical example of this in the historical record [3] that when the British Expeditionary Force went to France in 1914 there was "no responsible administrative medical officer attached to the Commander-in-Chief's Staff, with whom important administrative questions of the strategical dispositions of medical units could be considered and by whom a link could be formed between the Medical Services of the Field Army and the lines of communication. These were essential functions which belonged to the D.M.S. of the Expeditionary Force. They were of extreme importance in connection with the evacuation of sick and wounded to the hospitals on the lines of communication."

Generally speaking, the experiences of the earlier years of the Great War indicated that the efficiency of the Medical Service in any particular theatre of war was in inverse ratio to the distance of that theatre of war from the shores of England. It appears therefore that public opinion was a strong factor in bringing about the co-operation which led to the

efficiency of the Medical Service in the later years of the war. The public opinion of this country is generally right, and there is no reason why the harmonious co-operation which resulted from its pressure should not be a permanent feature in the solution of medical problems of war.

Casualties may amount to a very large percentage of the forces engaged, and one cannot help feeling that if the problem of their removal was regarded more as a tactical withdrawal of troops under special conditions, greater interest might be stimulated in the minds of combatant officers. They would realize more fully that the problem of collection, evacuation and disposal of casualties is in reality an important branch of the military art.

THE IMPORTANCE OF TRAINING.

The Medical Service is essential to the Army; it is not a thing apart. If it is to function efficiently in war it requires peace-time training to that end. The extent to which it is possible to carry out this training is dependent on financial considerations, but the minimum training at any time should aim at producing a highly trained nucleus of officers for administrative medical duties and for command of medical units with, in addition, trained cadres of other ranks for the medical units which are required on the outbreak of war.

If this training and the co-operation of the staff be forthcoming, the prospects of the Medical Service of the Army carrying out its duties with success in any future war can be regarded with equanimity.

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MALARIA IN INDIA.

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(*Continued from p.* 91.)

Part II.—Anti-malaria Work and a few Suggestions.

It is impossible to write about "Malaria and its Prevention" without encroaching on work already carried out or suggested by others, so it may be well to state that this article is not intended to be in any way original, but rather the bringing together of experiments and records of works already carried out, in such a way as to make reference to the more worthy publications unnecessary. A reference list is appended, however, so that those wishing to refer to the original articles may do so.

At the time of writing I have spent approximately twelve years in India, of which all have been in the Ferozepore Brigade area, except the hot weathers of 1910, 1924, 1925, so I think it may be presumed that I have at least a superficial knowledge of the conditions and improvements there, if any, during the past twenty years.

Malaria seasons have followed year after year and much time and money have been spent, yet there seems to have been little success attained in combating the disease, and the question arises, "Are we attacking the disease from the correct angle and, if not, from what angle should it be attacked?"

Taking the Punjab alone, there were 1,339,754 reported cases of malaria with a death roll of 358,679 in the year 1927 [1]. The strength of the troops in India, given in the same report, shows British 55,632 and Indian 133,082, with 7,732 and 13,111 admissions for malaria respectively.

In 1928 there were 5,142 cases of malaria amongst 56,327 British troops, a decrease of 2,590 cases over 1927. Ferozepore headed the list with a ratio per 1,000 admissions of 248·9, or practically 25 per cent. of the strength of the British troops in the station [2].

It is realized by all who have studied malaria that before a fresh case can occur three factors are needed: (*a*) the infected man; (*b*) a mosquito capable of transmitting the disease; (*c*) the healthy man. There are other factors such as humidity of the air, temperature and general weather conditions, but these need not be considered here. These main factors may now be dealt with in the order given above.

(*a*) *The Infected Man.*

We have here a man harbouring the infective parasites of malaria in his blood who, although he cannot convey infection directly to his companions,

can do so under favourable conditions through the agency of certain species of anopheline mosquitoes. He is therefore a potential danger to the community, and as such must be dealt with ; but by what methods?

As shown above, approximately 25 per cent. of the British troops in Ferozepore in 1928 were admitted to hospital suffering from malaria, but many of these would be relapse cases. Mackenzie gives the proportion of relapses to first attacks as 1·6 to 1 [3], so that amongst the troops there can be only a very small percentage of carriers on any given date, and it is not a very difficult matter to deal with the ordinary soldier, once he is found to be infected; but one has to consider other more serious sources of infection, such as the vast number of followers, officers' servants and other Indians, many heavily infected with the disease, who wander about cantonments and cannot be adequately controlled. They may take quinine during an attack of fever, but cease doing so as soon as the acute attack wears off; few use mosquito nets and their isolation is impossible.

If the spread of malaria depended upon the troops alone, it could easily be dealt with and the disease would be stamped out before long, but it is impossible to deal with the 1,300,000 cases, any one of which may carry the infection into cantonments. Quinine is procurable at most civil dispensaries and post offices, either free or on payment of a small sum, but the majority of the villagers are either too busy or too indifferent to fetch it.

The West African system of limiting the number of natives who live in the vicinity of Europeans could not be carried out with any hope of success in India, owing to the caste rules, for although many bearers and cooks are nowadays nothing better than converted sweepers, one can hardly consider the combining of the duties of one's cook and sweeper.

It may be of interest to mention here what may happen in the average hospital in the plains during the malaria season. There is invariably a special ward for cases of malarial fever; this rapidly becomes full, fresh cases appear and have to be accommodated, until there is not an unoccupied bed in the hospital and all hope of keeping the malaria cases isolated vanishes.

Mosquito nets are brought to hospital by all patients, but it has been found that the use of these is almost impossible in cases of high fever, owing to the intense heat, especially if the so-called mosquito-proof doors are kept closed. Electric fans also lose most of their benefits if nets are used, so finally in Ferozepore it was decided that only those men who were not already infected with malaria should use nets; infected men were allowed to discard their nets, reliance being placed on the electric fans. These arrangements worked well, and there were few complaints from the men regarding the biting of mosquitoes.

The question of nets *versus* fans has been raised frequently and is still not fully settled, but before anyone commences to criticize let him spend a whole hot weather in the plains of India, paying frequent visits to the wards

at all hours of the day and night and studying the pros and cons of each method. The picture of a ward full of fever cases gasping for breath is distressing, as are also the efforts of the nurses and orderlies to keep the patients from displacing the nets and thereby exposing an arm or a leg to the bites of mosquitoes.

The doors and windows of the ward are covered with mosquito-proof gauze; when these were being fitted with the gauze unseasoned wood was used, with the result that the frames all warped in a very short time, thus leaving spaces through which mosquitoes can enter at will; the mosquitoes, having found a good feeding ground, show no desire to depart.

When these doors and windows were being fitted, I endeavoured to explain their uselessness, but nevertheless the work was carried out. This is, I think, a good example of the unsatisfactory results which are likely to be met with where local authorities are allowed to carry out anti-malaria work on their own account, and also points to the necessity for having a central malaria control, consisting of both civil and military members, at Headquarters.

Fumigation of the wards during the busy time is impracticable. Spraying of the walls can be carried out, but this is unpopular with the patients, since a spraying solution which is both efficient and non-irritating to the eyes and respiratory organs has yet to be evolved.

Repellants are of use if properly applied. Of these, "P.C.," or "bamber" oil as it was formerly called, is the one in common use. It is made up as follows:—

Oil of citronella	1 part
Coconut oil	2 parts
Kerosene oil	1 part
Carbolic acid to make	0·5 per cent

Another useful preparation consists of one drachm of menthol dissolved in an ounce of turpentine.

A third consists of:—

Oil of citronella	1 oz.
Spirits of camphor	1 oz.
Oil of cedar	½ oz.

Orders are issued at frequent intervals throughout the malaria months that "P.C." oil is to be freely applied to exposed parts by all other ranks at dusk, the authorized scale being one ounce per man per week; sentries and others on duty at night are told to apply the oil at frequent intervals, as the weak point in all these repellants is that since their action is due to volatile oils these soon evaporate and the benefits vanish. All patients, nursing sisters, orderlies and others employed at night are instructed to apply the repellant at sunset and at two-hourly intervals, yet on making a surprise visit one night to the wards, it was found that all the bottles containing "P.C." oil had a piece of lint round the neck; on asking what this

meant, I was informed that "The orderlies do not like the smell and do not like getting the oil on to their hands when it is being issued to the patients." This difficulty was overcome by making the sister on duty responsible for the orderlies as well as the patients using the oil.

The presence of men of the I.H.C. in and near the wards at night is also a source of danger to uninfected men in the hospital, as many of the I.H.C. have chronic malaria and carry on without showing any acute signs of the disease. Concerning these men, there arose a very Gilbertian state of affairs. All ranks of the I.H.C. are provided with mosquito nets as part of their kit, but no poles are authorized; the men, when questioned on the subject, stated that they used the nets "like blankets"; this seemed rather useless as mosquitoes could easily bite them through the nets. After some correspondence authority was obtained to purchase one set of mosquito poles for each man, but their wives and children, having neither nets nor poles, could go on spreading the disease quite merrily. But worse was to follow; the barrack-master suddenly discovered that the members of the I.H.C. were not entitled to charpoys on which to sleep, and that those in use had been obtained on loan some years before; these had accordingly to be returned to store. The picture of a stout I.H.C. cook trying to keep up four mosquito poles with no attachments during a heavy dust storm was too pathetic to consider, so the whole matter was referred to higher authority. No reply had been received prior to my departure from the station.

It is obvious that the isolation or segregation of all possible carriers is hopeless and always likely to remain so in a country like India; the best the military authorities can do is to remove the infected soldier from his barrack room and either keep him in hospital or transfer him to some non-malarious station, where he will not be a danger to his comrades.

We must now consider what can be done to combat the mosquito.

(*b*) *The Mosquito Capable of Conveying the Disease.*

A list of the anopheline mosquitoes found in the various cantonments in the Lahore district is given as an appendix to this article. Kalka and Pathankot are mentioned as, although these are not cantonments, they are halting places for those proceeding to the Simla Hill stations, to Dalhousie and Bakloh (Appendix I). This list has been compiled from Memoir No. 5, "The Distribution of Anopheline Mosquitoes of India and Ceylon," by Major G. Covell, I.M.S., *Indian Medical Research Memoirs*. The species of anophelines actually taken by myself are marked with an asterisk on the list.

In another appendix will be found some remarks by R. Senior White on the habits of the anophelines found at Delhi; these habits would probably be the same in the same species at Ferozepore, as the two places are not very far apart (Appendix II).

In a third appendix will be found a copy of some remarks of "Resolu-

tions Passed by the Malaria Section of the Seventh Congress of the Far Eastern Association of Tropical Medicine, held in Calcutta in December, 1927." This last seems to point out that the chief work should be the elimination of breeding places (Appendix III).

Before considering what has to be done, one must find out how much money one has in hand and then work out a programme in accordance with the funds available.

In the Budget for 1929-30, a total sum of Rs. 28,872 was provided for the Lahore District. Of this sum a total of Rs. 4,134 was allotted to Ferozepore; this was divided as follows: For the Military Engineering Services Rs. 1,500, for expenditure other than M.E.S. Rs. 2,634; a small enough amount when one considers that the cantonment area covers nearly five thousand acres.

As soon as the allotment is known, the question of expenditure is brought up at the next meeting of the Anti-malaria Committee; here the S.M.O. has to express his opinion as to how the money should be spent, and also which of the works proposed by the M.E.S. should be classified as "anti-malaria," for naturally the M.E.S. want as much as they can get of the money.

I have before me the details of a meeting held to discuss the detail of work for 1927-28.

The chief items are :—

(*a*) M.E.S. Grant ;

(1) To continue pucca drain from the Sukkur Nullah to Mule Transport lines, through sand up to firm earth.
(2) Cleaning and grading all drains.
(3) New drains, and for soakage pits.
(4) Filling diggies.
(5) Culverts over kutcha drains.

(*b*) Expenditure other than M.E.S.

(1) Running anti-malaria pumping engine for one hundred days at Rs. 8 per diem.
(2) Fumigation of barracks and institutes.
(3) Anti-malaria gang labour and the supervision of oiling and bailing out smaller pools.
(4) Pay of coolies.

The total amount allowed for the period was Rs. 8,630, of which the M.E.S. took Rs. 5,600.

On considering the above, it does not appear as if items (*a*) 1, (*a*) 2, and (*a*) 5 should be paid for out of the anti-malaria grant, as they seem to come under the heading of ordinary engineering works. If the mule transport lines flood, it is in the interest of the health of the mules and for sanitary reasons necessary to drain them. Normal existing drains should always be kept clean and be properly graded. Culverts over kutcha drains are in many cases quite unnecessary and are likely to become resting places for

adult mosquitoes. Had the above works been paid for out of the ordinary M.E.S. grant, the sum of Rs. 3,600 would have been saved for legitimate anti-malaria improvements.

The distribution of these funds is always a matter of the greatest difficulty, and the Senior Medical Officer has always to bear in mind that if he does not advise that the funds may be used for the improving of drains and such work, the drains may be allowed to silt up and so form further breeding places. Personally, I would prefer to eliminate the M.E.S. entirely from my visiting list in the matter of anti-malaria work and give out the work as required to private firms, for in this way a much larger amount of work, of an equally satisfactory nature, would be carried out and the overhead charges of approximately twenty-five per cent saved.

Having dealt with the money side of the matter, one has now to consider the provision of a suitable anti-malaria brigade. This should consist of an Officer, an Assistant or Sub-Assistant Surgeon who must be properly trained and have attended a special course of instruction given by the local D.A.D.H. Perhaps one may be allowed to make the suggestion, which may prove unpopular with a particular group of officers, that it is not by any means necessary for D.A.D.H.'s to æstivate annually in the hills; if they were to spend the malaria months in some plains station their services might prove of the greatest value in supervising the anti-malaria work and in giving expert opinion. Major T. O. Thompson, R.A.M.C., described, in a recent number of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, the reply given by an officer of the Royal Engineers, who was Garrison Engineer to two malarious stations, when asked "To describe under certain conditions what anti-mosquito measures should be carried out?" replied, "Burn all litter to prevent the breeding of mosquitoes." It is to be hoped that such an answer would not be made by any anti-malaria officer, yet foolish mistakes are made even by these. Last hot weather my wife was in the garden of our bungalow when a Sub-Assistant Surgeon asked her for a tin or bottle, saying that he had found a large number of anopheline larvæ which he wished to take to the anti-malaria officer. He was given a tin and later brought back his captures to show them to my wife, who by this time had been joined by my daughter; the latter was so impressed by what she saw, that she at once brought some of the "animals" up to the British Military Hospital, as she was certain that I would like to have them. I fully realized that such zeal on her part denoted a "leg pull" somewhere, and on looking at the contents of the tin it was obvious that it contained young tadpoles. The S.A.S. concerned had been employed for some time on anti-malaria work and I had a very high opinion of his keenness, yet here he was making a most stupid mistake. Later I met the anti-malaria officer and asked him what he thought of his new pets; he replied that he had placed them in a breeding cage, but he thought that they looked rather like young tadpoles. He had apparently not taken any trouble to confirm his opinion and was obviously unfitted to be in charge of anti-malaria work.

Gangs of coolies are needed, each gang being under the direct supervision of trained British or Indian other ranks; the normal requirement is one gang to each square mile of cantonments, excluding unit lines, as these come under unit arrangements. On no account should a squad be divided. Recently two coolies were seen oiling pools by the roadside after a shower; the oil was being thrown into the pools in a haphazard way, whether they were large or small and quite regardless of the fact that all the pools would be dry again within forty-eight hours at the most. On asking where the overseer had gone I was told that he and one other coolie had gone down another road to oil the puddles there. This small incident shows that unless the anti-malaria officer keeps in close touch with the men working under his orders there will be wastage of material, also that work is not properly carried out once the gangs are split up. On another occasion when visiting one of several breeding places known to me in search of larvæ, I came upon a squad, consisting of one soldier and two coolies, who were applying "Paris green." This was being thrown by one of the coolies in the direction of the pools under treatment, it being seemingly immaterial whether any fell into the pools or not. On questioning the soldier, he seemed very vague in his answers and finally explained that he had come out in the place of one of the regular men, who was otherwise employed.

No arrangement such as this should be tolerated under any consideration; the gangs should be paraded at the office of the anti-malaria officer and should be marched off under their overseers.

What does not seem to be fully realized is that a permanent brigade is required, consisting of a Commanding Officer, an assistant, either an Assistant or a Sub-Assistant Surgeon, with the required number of gangs, each having a trained British or Indian soldier in charge. Special pay should be sanctioned and the men struck off all other duties. As far as possible the same men should be employed year after year, the work continuing all the year round.

In some stations much zeal is shown during the worst malaria months, that is to say, during and after the monsoon, little or no work being done during the rest of the year. Although such a procedure is totally wrong it is the only work which can be carried out with the present allotment; a much larger sum than that granted annually is needed if any headway is to be made.

One rule which should be rigidly enforced is the cutting off all irrigation during the monsoon. It is of little use for the military authorities to carry out expensive works if they are not supported by the civil authorities both inside and outside cantonments. Under existing conditions anyone may live inside the cantonment area, bungalows no longer being reserved for officers doing duty in the station, and an anti-malaria officer is diffident about approaching a bungalow in which an Indian is living, perhaps with a purdah enclosure in which mosquitoes are breeding in thousands.

Again at Ferozepore there is a large railway colony close to the cantonment boundary on one side and a canal colony on the other; little or no combined effort is made in either of these colonies to destroy mosquitoes though some of the Europeans look after their own compounds.

A letter was sent to the civil surgeon, who was also medical officer to these two colonies, asking him what steps he was taking to prevent mosquito breeding in these areas. He replied that he was doing nothing and referred me to the District Medical Officer of Health.

The latter apparently misread my letter, as he replied, "I am not doing any anti-malaria work in the vicinity of rivers and canals, except an engine is pumping out the water from the vicinity of the city to the river and thus trying to reduce the level of the surface water." As this water soaked through from the river to which it was returned by the pump, the M.O.H. seemed to have solved the problem of perpetual motion, except for the fact that the engine was frequently breaking down or was not working owing to the advent of one of the numerous Hindoo or Mahommedan holidays. Nothing was done to drain away, fill in, or oil the stagnant pools in the vicinity of either of the two colonies, even though large numbers of mosquito larvæ were always to be found here. At a meeting of the Anti-malaria Committee held later, the M.O.H. offered to bear the expense of filling in burrow pits in the cantonment area, a work which did not concern him and which was already being carried out by the military.

The above remarks are not intended in any way to reflect on the M.O.H. personally, as he possibly had no funds available for carrying out useful work, but to show what one has to contend with and to raise again the question of the formation of an Anti-malaria Department at Simla or New Delhi, consisting of both civil and military members, who would have charge of the arrangements for the whole of India. Until the civil and military are made to combine and to take the matter seriously no improvement can be looked for.

Surrounding the cantonment area are miles of agricultural land, used for growing rice and other crops; in pools round these fields, especially the rice fields, I have often found hundreds of anopheline larvæ. These areas come under the control of the civil authorities who can do little of any value owing to lack of funds for the purpose. Again, supposing it was decided to forbid all irrigation in the vicinity of cantonments during the malaria months, one must consider the loss to the local farmer. According to Rickard, *Anopheles pseudopunctipennis* has, in the Argentine, a normal range of flight of two and a half miles, some individuals flying three miles and three-quarters. It would never be possible to lay waste so large an area [4].

Recently the sum of Rs. 200,000 was granted from the military budget for anti-malaria purposes, this sum being for the whole of India for one year. It is obvious to anyone with any experience of the subject that the

amount is totally inadequate if any new works are to be carried out; it barely suffices to cover the normal hire of coolies and routine work.

Of the above sum Rs. 4,134 were allowed to the Ferozepore cantonment area consisting of 4,958·25 acres, or less than a rupee an acre, so the question of carrying out any large works obviously cannot arise.

In 1924, after making a malaria survey of Lahore cantonment, I suggested that to get useful work done by the anti-malaria gangs it was necessary that each should be in charge of reliable British or Indian soldiers; yet it was not until 1930 that this scheme was adopted at Ferozepore.

In October, 1929, a letter was sent to the occupiers of all bungalows, by the executive officer, asking them to have a "dry" day once a week, when all irrigation would cease and all sumps, water channels, and any other collections of water would be emptied. This was an excellent suggestion and was taken up more strictly by the Brigade Authorities in 1930, orders being issued on the subject.

Owing to the practice of using large amounts of larvicides yearly, instead of filling in the breeding places and so disposing of them permanently, it is possible to make a few remarks concerning the more common of these places.

(1) The fort moat. This is undoubtedly one of the danger spots so far as the fort garrison is concerned and the majority of cases coming into hospital give a history of duty in the fort at an earlier date. It should however be realized that the moat is not the only possible breeding place near the fort, as cultivation is carried on right up to the edge of the fort zone, which is about four hundred yards wide; there is also a village quite near the fort, where anopheles can frequently be found.

All the waste water from the fort and arsenal drains into the moat, which is otherwise dry, except during the monsoon. High grass and weeds were allowed to encroach into the moat, and when complaint was made regarding the blocking of the drains and mosquito breeding it was suggested that the area might be cleared at the expense of anti-malaria funds; this was objected to on the ground that it was a defensive measure to have all cover removed, besides which the whole of the anti-malaria grant would be expended long before half the area could be dealt with. It was finally decided to try the experiment of letting the moat to an Indian who was to cut down the high grass and make what profit he could by growing vegetables. I have since heard that this scheme has been abandoned and that the work of clearing the whole area has been put in hand. There are three sumps in the moat into which most of the water drains; from these the water is pumped out on to open ground where, unless the anti-malaria officer is very careful in his inspection, anopheline larvæ can usually be found during the season.

(2) Inside the fort and arsenal the drains are in many cases covered over, yet in spite of small boys being sent into the drains to sweep them out, they make very dangerous resting places for adult mosquitoes and also often contain larvæ. In addition there are large fire tanks, old tins, and

empty barrels in which water can be collected. When mentioning these old tins it may be of interest to make a digression and to record what actually happened in 1930, as it shows what difficulties the anti-malaria officer has to contend with. On one occasion he found some hundreds of old tins taken from empty ammunition boxes; many of these contained water which was teeming with mosquito larvæ. The Chief Ordnance Officer was asked to have these tins emptied and inverted; this was done as soon as possible. An auction of these tins was held shortly after this and the tins were again found by the officer in the Sadar Bazaar, in cantonments, containing water and larvæ.

One very important source of infection is the presence of about 3,000 Indian employees working in the arsenal, many of whom suffer from malaria; they carry infection into the workshops and stores, in which they are bitten by mosquitoes, which later pass on the disease to the fort garrison.

(3) Pools on the Faridkot Road. These have been reported on ever since I first visited Ferozepore in 1910, and are undoubtedly one of the chief sources of infection of men in the R.A. lines. These pools are found both inside and outside the cantonment boundary, especially during and after the monsoon. Not very far away are some old mounds, the remains of some old brickfields, and in 1929 it was suggested that these mounds could be used to fill in the pools. The question of labour arose, and as there was a well-filled jail in the vicinity application was made for convict labour, but the application was refused. Here again co-operation between the civil and military is indicated, or the suggested central committee could have arranged the matter.

On visiting this area in 1930 I found a large lake in place of the pools, but am unable to say whether this was an effort at dealing with the malaria question or merely an act of God.

There are numerous other breeding places, which have been reported upon yearly and have received their frequent supplies of oil or Paris green, yet no effort has been made to fill these in, such work being more expensive owing to the scarcity of material. It may be suggested that cantonment rubbish could be used for the purpose; certainly some of it could be used after being burnt, but most of it is sold to contractors who use it for manuring their fields. If used to fill in holes it would mean that transport would have to be hired and also that the money paid by the contractors would be lost.

Having shown some of the few points one has to contend with one may now consider what has to be done, and to simplify matters the various items will be taken in the order given in the "Commentary on the Health of British Troops in India during the year 1929."

(*a*) Get water underground where possible. The water supplies in Ferozepore are all drawn from wells, the majority being of the "shallow" variety, of which there must be well over two hundred in the cantonment

area. Anopheline and culicine larvæ have been found in several of these wells and it was suggested that certain alterations should be made; the Anti-malaria Officer was written to on the subject (a copy of the letter will be found as Appendix IV). Little notice was taken of the suggestion, but a few wells were covered over in unit lines by the M.E.S.

(*b*) Failing (*a*), provide facilities for the free run off of water. In this respect nullahs may be divided into two categories: (1) storm water channels and (2) permanent drains which always hold water from springs or other natural sources.

Regarding (1), storm water drains exist alongside each road; as a rule these are badly kept, overgrown with grass and if not dealt with allow water to stagnate in which mosquitoes will breed. The grading of some is very bad, some in fact running uphill.

Through the middle of the cantonment there runs a large drain, commonly called the "Sukka Nullah," this was originally connected with the Sutlej River; into this drain most of the storm water eventually finds its way. A considerable amount of money has been spent on trimming the banks, but much damage is done yearly by the troops and by cattle crossing over the channel instead of using the bridges. Several drains run into the nullah, in some of which, especially two near the British Military Hospital, anopheline larvæ are constantly being found; but the drains have not been made pukka owing to the cost.

The nullah enters the cantonment boundary near the North Western Railway workshops; here an almost continuous stream of water flows into it; luckily this water is heavily mixed with oil and mosquitoes rarely breed in it. The channel next reaches the grass farm; here the banks are frequently found to be overgrown with grass and weeds, considerable difficulty being experienced in getting anyone to take action in the matter. After leaving the grass farm the channel becomes more open and can easily be dealt with until it reaches the cantonment border, where for purposes of irrigation the local landowner has blocked the channel, the result being that a small lake and some pools have formed in close proximity to the lines of an Indian infantry regiment. As this lake is outside the cantonment boundary it is not at once possible to order its removal.

One piece of work, carried out at the cost of anti-malaria funds, was the building of small brick pillars at frequent intervals, along the course of the Sukka Nullah which were, I was informed, to mark the course of the channel as a guide when future works were being carried out. As the nullah varies in width from about 6 to 10 feet with a central channel 3 feet wide and at least 2 feet deep it did not appear as if even the most ignorant coolie could lose either himself or the channel, and if he did the addition of a series of brick pillars would not help him very much. In any case, as the nullah is the chief storm water drain for the Sadar Bazaar and the cantonment as a whole, such work, if really considered necessary, should have been paid for out of the general M.E.S. grant. It would have

been much better to have expended this money in providing a fence alongside the nullah to keep out men and cattle.

It was suggested in Lahore that pits should be dug at the ends of small branch drains leading from the main storm water drains. These pits were to be sufficiently deep to pierce the first layer of clay and were then to be filled with pieces of broken brick and stones, so forming deep soakage pits, through which surplus storm water would soak away. One defect which had to be considered was that if the pit silted up it might prove to be an ideal breeding place.

Such a scheme would be impracticable at Ferozepore, for since all water comes from open wells or in some cases from shallow tube wells, some of which have been proved to be contaminated with *B. coli*, the digging of these pits would tend to increase the danger of contaminating the whole drinking water supply of the station, also the pit would have to be deep in order to pierce the first layer of clay. (Appendix V.)

(*c*) Standing collections of water, e.g., ponds, etc., to be drained, filled in, or, if these methods are not possible, treated with larvicides, such as oil or Paris green, or stocked with suitable fish [5]. Many large and small collections of water exist and have been proved to be breeding places year after year, but little or no effort has been made to fill in or drain them; also there are in the cantonment area hundreds of old trees which are in part dead and which contain numerous holes and depressions in the trunks, any one of which would produce thousands of larvæ in a season if eggs were laid in them by mosquitoes. Many of these trees have been cut down as they were in a very dangerous state, and examination of the cavities in the trunks was of great interest as they contained remains of birds, nests, beetle larvæ, lizards and occasionally a snake. Numerous crawling and flying insects were found when searching the cavities and it is highly probable that these cavities may also have sheltered adult mosquitoes.

The old cry "Dig and fill in" is good in theory, but very difficult to carry out in the plains. If drains are dug they must be made "pukka," otherwise the sides will soon fall in and the drains will become useless. To "fill in" one must have material which in most cases can only be obtained by digging fresh holes. If ample funds were available it would be possible to employ a staff of men to look after the drains, and it would no longer be necessary to sell all the cantonment rubbish, which could then be used for filling in holes and depressions.

One important point must be considered here, and this is that it is useless to attempt any anti-malaria work until one has a reasonable knowledge of the life history of the local vectors; for example, it is not the slightest use draining a swamp in which a suspected vector is known to breed, if in so doing one constructs drains and other water channels which will form excellent breeding places for a known and dangerous vector. The most obvious way of dealing with lakes or swamps, which for some reason it is not permissible to fill in, is by subsoil drainage, but this is

usually impossible owing to the cost and for other reasons. However, the first consideration in the case of swamps is that of filling in; failing this some way of draining must be carried out, care being taken not to make matters worse by forming more dangerous areas for breeding. Anti-malaria officers should therefore not order work to be performed until this point has been fully considered. Here again is a reason for the central committee of experts.

The importance of "filling in" is gradually being realized, for residents of bungalows were sent a letter to the effect that "certain depressions are reported to exist in the compound of your bungalow. As these depressions hold water and become breeding-places for mosquitoes, it is requested that you cause them to be filled in as soon as possible. In the case of the compound of X.X.X., if the existing depression is in use as a duck pond, this need not be filled in but must be oiled."

The issuing of this order was a very good beginning, but it is open to criticism. The letter should, in my opinion, have been addressed to the landlord and not to the tenant, as the latter would send the order on to the former. The average landlord has at present little or no respect for his tenant and will as a rule do little to oblige him, knowing that, owing to the general shortage of bungalows, if one tenant vacates another will at once occupy the house; whereas he has a marked respect for the Cantonment Committee, since this body can inflict severe penalties if the landlord does not do what he is told.

The mention of "depressions" again draws attention to "burrow pits." Clear information on the subject can be obtained from paragraph No. 6 of Army Headquarters, Military Works Branch, Circular No. 14 B, dated 21/11/18. This reads as follows: "6. Burrow pits are not allowed within a mile of barracks for the purpose of obtaining earth, unless the local military medical authorities are of opinion that they will not be a menace of the health of the inhabitants of the Cantonment. If such pits are required by the civil authorities in connection with roads and railway embankments the matter should, if possible, be settled between the local civil and military authorities concerned; otherwise it should be submitted for decision of higher authority."

The above instruction is perfectly clear and concise, yet where road repairs are being carried out by the P.W.D. burrow pits are dug with impunity. An even worse state of affairs recently arose at Ferozepore, for not only were numerous burrow pits dug during road repairs, but the bank of an irrigation canal was cut to supply water for the road, the result being that an ideal breeding-place for mosquitoes was formed within a quarter of a mile of the fort, at a time when every effort was being made to destroy every breeding-place in the vicinity. Again, when a landlord orders repairs to a bungalow, the first thing that happens is that a coolie comes and digs a burrow pit in the garden; this pit is invariably left patent unless the tenant looks after it. Anti-malaria squads could do good work in this

respect by reporting any such depressions found by them, which they cannot deal with, to the anti-malaria officer, the order for filling being sent by the Executive Officer to the landlord and not by the military authorities to the tenant.

Having considered "draining and filling in," more or less fully, one must now decide what is to be done in cases where neither of these is possible and where the actual destruction of larvæ, and later of adults, is to be undertaken.

In permanent collections of standing water, such as ponds needed for watering cattle and fire tanks, the introduction of small fish of the minnow variety which are surface feeders is worthy of consideration [5]. There are many natural enemies to larvæ which also destroy large numbers, some of these are given in an appendix (Appendix No. VI).

To digress for a moment. It may be of interest to fishermen to know that both Murray in 1885 and Combes in 1896 saw culex destroying small trout; the mosquitoes attacked the very small fish, sucked out the contents of their heads, and when released the little fish turned belly upwards and floated, dead.

In small collections of water or those which are not of a permanent nature, the use of some larvicide is indicated.

Until recently, oiling has been the chief method to be employed for the killing of larvæ, various mixtures of oils being used. In 1930 a paper was published by Clarkson, who described the results of some experiments he had carried out. He found that the following mixture was of the greatest value, almost complete control of anopheline larvæ being obtained with it:—

Black oil	20 per cent
Kerosene	20 ,,
Paraffin oil	60 ,,

The black oil maintained the film, and paraffin oil acted as a spreader, the kerosene being toxic to the larvæ. This mixture was used at the rate of two and a half U.S. gallons to the acre, the total cost, including labour but excluding equipment, was about 5s. 6d. an acre for each application [6].

Various other oil mixtures have been used, but one point which must be borne in mind in a country such as India is that the mixture must not be suitable for use in lamps, for if it is a considerable amount will be stolen by the coolies for use in their homes.

There were certain objections raised, from time to time, to the use of oil, the chief being :—

(1) It cannot be used in drinking water.

(2) It is not very cleanly.

(3) If too much oil is used it is detrimental to plant life, especially to young seedlings in gardens.

(4) Animals will not drink water to which the mixture has been added.

(5) If fit for lamps, a considerable amount is likely to be stolen.

Cresol was also recommended and is useful in the destruction of larvæ,

but no dilution above 1 in 100,000 is of the slightest use. This has been thoroughly worked out by myself, both under laboratory and field conditions [7].

In recent years a preparation known as "Paris green" has been used in anti-malaria work and is of the greatest value in the destruction of anopheline larvæ; the fact that it only destroys larvæ is one of the chief objections to its use. Paris green is a double salt of copper acetate and copper arsenite and should contain fifty-eight per cent of insoluble and less than one per cent of soluble arsenic. Before application it must be mixed with dry road dust in a mechanical mixer, the strength being one per cent of Paris green to ninety-nine per cent of dust. The quantity to be used is thirty-five ounces of the mixture (0·34 ounce of Paris green) to each thousand square feet of water surface. The personnel employed should wear overalls and gloves and should wash their hands after work. The mixture should be scattered by hand or by means of a small blower, so as to form a thin film on the surface of the water; it should be thrown down wind. Vegetation need not be cleared. Pupæ are not killed by this larvicide, therefore water should be treated sufficiently often to kill all larvæ before the pupal stage develops. It does not destroy vegetation, nor have any accidents been recorded. It should not be used on water intended for human consumption." The above is an extract from a demi-official circular sent round for the information of anti-malaria officers. From personal experience I have found it to be a most satisfactory larvicide. The following are some of the advantages and disadvantages of its use: (1) Advantages: Small cost; no smell; has no effect on pond plants or aquatic fauna; is equally useful whether used on clear or weedy water. (2) Disadvantages: Does not affect eggs or pupæ; does not affect culicines in any stage; it can only be used on still water, as any disturbance of the surface, such as a current, wind or rain, will tend to make it sink; it is not usable in drinking water tanks and although, according to Bilii, cattle can safely drink water dusted with the mixture, as they dip their muzzles deep below the surface, dogs and ducks which drink on the surface are poisoned [8].

Remarks are often heard criticizing the efforts of the anti-malaria squads, but when one considers the many thousands of breeding places that have to be dealt with during the monsoon it is up to every one, to cease criticizing and to try to do something to help in the destruction of the mosquito in some way or other. One does not need a high medical qualification to decide whether a small pool in one's garden is likely to prove a breeding place or not; the thing to do is to empty out the water, or better still to fill in the depression.

When dealing with the larvæ the anti-malaria officer should keep a spot map showing where larvæ have been found; this is of the greatest use to the officer himself and, should he be moved (a not infrequent event in many cases) to his successor. That this point is not realized by some officers is

borne out by my own experience. I kept a spot map of the Ferozepore area from 1911 until 1914, showing all the breeding places I had found in this period; on returning to the station in 1925, I wished to refer to the map and found that not only had the "spotting" not been kept up but that all the entries I had made previously had been most carefully erased.

The next matter to be considered is that of destroying the adult mosquito; this may be done in many ways, but a good knowledge of the bionomics of the various species is necessary before any work of value can be carried out.

The species of anopheles found at Ferozepore are given in Appendix I.

I have personally caught *A. subpictus* (*A. rossii*) as early as April and as late as December; *A. stephensi* in April and September; *A. culicifacies* in July and September, and *A. pulcherrimus* in September, in Ferozepore, and *A. subpictus*, *A. stephensi*, and *A. culicifacies* in September, in Lahore Cantonment.

It is a regrettable fact that, at present, our knowledge of the bionomics of the chief vectors is slight, but more information on the subject is coming to hand yearly. Here again the knowledge is not "broadcast" with sufficient speed, for, although a monthly report is sent on Form D.M.S.4, the information given in many cases is useless or nearly so to any other than the anti-malaria officer himself, as at the best the report states, "Larvæ of anopheles mosquitoes found at A, B or C." A, B, and C being pools or depressions which have been found to contain larvæ, but which cannot be located by anyone who is not engaged in the work, also the finding of larvæ may not be of the least value as the larvæ may be those of a non-vector. In the series of forms examined not one gave even the suggestion that the larvæ found might be those of any special species, nor was any report attached to the effect that any of these larvæ were hatched out into adults in the laboratory; the most probable reason for this being that the average anti-malaria officer, or rather the officers employed in this work, are quite incapable of differentiating the various species even if they caught them. The reply to these criticisms possibly will be that specimens may be sent to the Central Malaria Bureau, Kasauli, for examination and report; this should be quite unnecessary as the local medical officers should have a knowledge of the anopheles found in the stations in which they are serving. When the Form D.M.S.4 was introduced it was, I understand, hoped that before long it would be possible to issue reports concerning the bionomics of the Indian vectors in the different cantonments, but the information given was of so little value that this has not yet been possible.

In a previous report I was told that many of my suggestions could not be carried out, owing to their being "counter to approved administrative measures." This may be the case, but it should be clearly understood that this article is intended to deal with the prevention of malaria, and will therefore probably not always agree with "administrative measures." A central headquarters body could discuss the matter with those concerned and

settle it in a more or less friendly manner, although there is little doubt that if the elimination of malaria is to be given first consideration a considerable number of "approved administrative measures" will have to go to the wall. This will not be the case, however, until some really valuable efforts are made to counter the effects of the disease amongst the civil population; such efforts are not anticipated during the present generation, at least.

How is it possible, under existing conditions, to wage a satisfactory war on the adult vector?

The process of fumigation suggests itself, but this is of little value in the majority of barracks in the Punjab. Richmond found in Peshawar that the fumigation of even small barrack rooms has little permanent effect. He fumigated three barrack rooms daily from September 12 to 21 inclusive, with the following results: the daily catches were 211, 74, 116, 159, 209, 121, 174, 122, 118 and 136. These figures apparently include all species of mosquito, not anopheles alone.

Experiments which had been carried out previously at Ferozepore showed that fumigation is of little use. A knowledge of the bionomics is again useful in this respect, for it is of little use expending the already insufficient funds in efforts to destroy the vector by fumigation if the vector, like *A. culicifacies*, does not rest in buildings but only enters them in search of a meal.

Spraying the walls and ceilings of buildings is a more satisfactory method, as it is less expensive and no blocking up of windows and doors is necessary, but it cannot be used in rooms unless they can be vacated for some hours, as nearly all the present spraying solutions are irritating to the eyes or the respiratory passages.

On April 15, 1929, instructions were received from District Headquarters "to fumigate all barrack rooms with cresol to destroy hibernating mosquitoes if this has not already been done." This letter is quoted, not as a criticism of the methods employed in any particular office, but to show one or two weak spots in our efforts to eradicate the mosquito.

Firstly, in view of the District Headquarters letter quoted above, it appears that fumigation is of little permanent value, therefore the money spent on carrying out fumigation of the barracks might be spent more profitably on spraying or minor or major works.

Secondly, as the shade temperature at the time was well ovêr 100° F., "æstivating" and not "hibernating" mosquitoes, if any, would have been the victims. This letter was sent out much too late; to have proved of any use the instructions should have been sent out in January, the work being completed by the last week in February at the latest.

Thirdly, the bionomics of the local mosquitoes are not fully known; possibly they do not hibernate as adults, or if they do they may not hibernate in buildings, such as barrack rooms.

Another method of destruction is by "swatting," or by means of the

"soapy hand." In the latter method the hands are dipped into a solution of soap and water, the sitting mosquito sticks to the wet hand when this is placed over it. It is quite possible to rouse a very considerable amount of interest in this method amongst the men in a barrack room, as it relieves an otherwise monotonous life in the hot weather; the men have even been known to bet on the results of their chase.

Traps are on the whole unsatisfactory, the catches being very small. Some time ago the details of a trap occurred to me, and a description was sent to the Editor of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS. (A short description of this trap is given in Appendix VII.)

Although the idea of this trap was due to certain experiences of mine, a similar type was, I understand, used by La Plante when working in the Panama Canal zone; a trap of this type is also in use on the Continent, where it is used for trapping the nun moth.

The chief work to be carried out by the coolie gangs is the cutting down of brushwood and the destruction of possible resting places.

(*To be continued.*)

THE DOCTOR'S WAR.

By D.A.D.M.S.

(*Continued from p.* 41.)

Part II.

I arrived at Marseilles in April, 1917. The journey from Dover to Havre had been placid enough. Of course the ship was very crowded, but that mattered little to one who had experienced the Channel crossings on the ordinary leave boats. Perhaps the interesting part of it was that most of the khaki-clad passengers were going to the War for the first time, and just setting out on the great adventure, and that struck one as so odd in the year of grace 1917. After all it was the greatest adventure the British have ever taken part in. All the previous little wars had been just class affairs, the Regular Army and a few gallant souls who volunteered. Like the South African War, with its C.I.V.'s and Yeomanry. Why, I knew a bank clerk who was in the South African War; he had been taken prisoner by De Wet and spent a year in a prisoner of war camp in the Transvaal. He talked about that for the rest of his life. I also knew a young hunting fellow who went out to South Africa with the Yeomanry; he talked incessantly about the terrible hardships of the troopship, how they had to sleep in hammocks, how they had to use Army blankets, great coarse brown things.

But this was the big adventure for the man in the street. We were all in this affair, and most of the fellows on the boat were recently joined up doctors, and I was taking out a bunch of them to staff a hospital in Salonika. We had joined up together at Blackpool, of all places in the world. There the Royal Army Medical Corps had its War Headquarters. Some 30,000 officers and men of the R.A.M.C. collected there for training before being shipped overseas. The pre-war Army Medical Corps had trained and had its headquarters at Aldershot. But that was just for the little Regular Army; now we had some millions of soldiers at a war, so the R.A.M.C. had overflowed Aldershot and come to breezy Blackpool. I was billeted at a hydro kept by a charming Swiss gentleman who fed me well, lodged me well, gave me a Turkish bath every day, and all for seven shillings a day. I wish I could find that place again.

Well, there we were at Blackpool, training to be soldier doctors, soldier hospital orderlies, and field ambulance stretcher-bearers. It was just like any other Depot. Wounded and sick R.A.M.C. men came there after being released from hospital, getting ready to go out again. Freshly called up men came there to learn something about soldiering, and doctors came to be taught something about how soldiers were doctored. It was all terribly smart and regimental. The R.A.M.C. prided themselves on the fact that

they could administer and organize a centre for 30,000 men all on their own without any assistance from their fighting brethren. And very well they did it. But it seemed odd to see a doctor walking about as a Provost Marshal, keeping strict discipline and checking other doctors for not saluting properly or for being improperly dressed!

But after all, why not? If you put a doctor in uniform you make him an officer, and he wants to behave as an officer, and take a pride in his uniform and in his Corps. Perhaps there were irksome regulations that bore heavily on middle-aged practitioners. One indignant doctor told me he had been ordered to "Stand up, man, get your hair cut, and for God's sake learn to put on your leggin's" by a young fellow who might have been his own son. But that was better than being ticked off by some senior combatant officer in the streets. One doctor I knew was pulled up by a General in the streets of Newcastle-on-Tyne. He had passed the General and acknowledged him by a perfunctory wave of his cane. He was shouted at and asked what the "devil he meant." He indignantly replied, "I am a professional man and refuse to be spoken to like that." But the General ran him in and there was the devil to pay.

So much better learn the little ways of the Army at Blackpool before going out into the hard cold world full of Generals. But all Generals were not like that sort of "what, what" type. One G.O.C. reproved a young temporary lieutenant in the neatest and kindest way. It was the same question of failing to salute when passing in the street. The G.O.C. stopped the young man and said, "What army do you belong to?" The somewhat flabbergasted youth replied, "The British Army." "Well do you know," said the General, "I also belong to the British Army; wouldn't it be nice if we just recognized each other as we passed?" Now I am on the subject of such incidents I must tell the story of the very small General at the docks who passed a very tall Captain, R.A.M.C. (T.C.). The very small General said, "Don't you recognize a General Officer when you see one, sir?" The very tall Captain looked down, surveyed the small General, and said, "Yes, *when* I see one."

During our night crossing to Havre one gallant medico kept us all awake by going up on deck and coming down again to tell us "we are now in the most dangerous submarine zone." I will not dwell on the rest camp at Havre because I didn't stay there. All field officers were allowed to stay at hotels, and, of course, pay their own expenses. So my two majors and I spent the night in the Hôtel du Commerce, or something like it. I know we went to a music hall and saw a most unpleasant performance of a man without arms doing all sorts of things, like writing, knitting, lighting cigarettes, etc., with his toes. Next day we entrained for Marseilles. There was a little anxiety, as two young officers had not turned up at the morning parade, but they arrived in time to catch the train. For four days and four nights we ambled slowly through France in a troop train. Our Mess President had been like Kipling's sailor, "Buy

a ham and see life," for we seemed to live on ham sandwiches all the time, or what he called a sandwich, a lump of ham between two slabs of dry bread.

On arrival at Marseilles a rest camp awaited us, and the field officers escaped to an hotel. It seemed wrong to dump officers below the rank of Major in a rest camp and encourage senior officer to go to hotels, but such was the law of the camp, and field officers were not wanted. I suppose they could be trusted not to get into trouble in the town, and if kept in the rest camp they would only grumble and worry the Camp Commandant. Our "female nursing staff," as they were most ungallantly called, arrived, and were parked in a camp beside the sounding sea, if the Mediterranean can be described as "sounding." A ship called the "Transalvania" was to sail in a few days, and we expected passage to Salonika at any time. We haunted the office of the Base Commandant for news of sailings. But it was 1917, and the submarine was very busy in the Mediterranean, so all was secret. One fine morning I was sent for, and was told the "Transalvania" could take the ninety Nursing Sisters and V.A.D.'s waiting at their seaside resort, but could not take any officers or men of my general hospital. So we were left for a later boat. I turned up again at the Commandant's office in twenty-four hours and was met with a gloomy restraint and silence. "Any news of a ship for us?"—"No."—"Nurses get off all right?"—"Oh, yes, they *got off* all right." Then the Commandant took me aside and told me. "'Transalvania' was torpedoed sixteen hours out, and sunk. I think all the nurses were saved, but some 400 people have been lost." What a nasty shock! All those poor girls suddenly put into such terrible danger. And they were all so brave and cheery, looking forward to this adventure in the East with eagerness, and so terribly keen about it all. News began to trickle in, and soon it was known that just sixteen hours out the ship was hit by a torpedo, and when settling down was hit a second time. The escort consisted of two Japanese destroyers; they dashed about, fired, put down depth charges, but I doubt if they ever saw the periscope. The sea was choppy and the people on the boat said they saw no sign of the submarine. By the greatest good luck and forethought, all on board had been exercised in boat drill immediately they sailed. That evening the question of a concert was discussed, and the matron had given orders that all the nursing staff would parade in the saloon at 10 a.m. next morning to discuss the concert and find out talent in that line among the ninety girls. Just a few minutes after they had all collected in the saloon "bang" went the torpedo. At once the girls were marched to their boat stations. They were soon got away in boats and missed the subsequent tragedy of the second torpedo and the quick plunge of the ship to the depths of the sea. But they had their own troubles and dangers. One boat leaked and gradually became water-logged. The sea was rough and all were distressingly sea-sick. The fate of the leaking boat was getting desperate; some of the occupants

had been washed out of the sinking boat and were dragged back again. Up dashed a Japanese destroyer and soon had them all on board.

The Japanese sailor is a real handy-man, he can massage like an expert. In no time they had those half drowned, chilled, collapsed girls warm and comfortable. They were landed on hospitable Italian shores and were taken care of. Soon they returned to Marseilles, back to their seaside camp. Poor things, they had had about enough of that treacherous sounding blue sea. It now became a question what to do with them. They had only the clothes they stood up in and were supremely uncomfortable. Of course they must all go home. But some higher-up person said "No." They must refit at Marseilles and they were to be given some £48 of English money to do it with. I agitated over this; it was obvious these girls wanted a decent rest before setting out to face the same peril. To refit complete in Nursing Sisters' kit could not be done in Marseilles. I expect the higher-up person thought that an outfit on the lines of a French Sister of Mercy would do for English Nurses and V.A.D.'s. A little persistence won the day and all the girls were sent off to England to recuperate and fit themselves out. I should like to put on record that out of that batch of young English women, numbering ninety, having been exposed to deadly peril on the high seas, having escaped a horrible death by almost a miracle, having sustained the biggest kind of mental and physical shock that human beings could undergo without losing life or reason, eighty-nine again set out for Salonika three months later and took up the work they had set out to do. One girl only could not come, she was dangerously ill from pneumonia when the party started for the second time. I don't think "frightfulness" is of much use with British people. I suppose the submarine was intended to frighten the British off the sea; it didn't even scare the women of England from embarking on the seas!

Now followed a dull three weeks in Marseilles. The Commandant's Office was silent as the tomb, the very mention of the word "ship" caused a profound silence. However, Marseilles has its charm. Personally, I like the old City immensely. There is such life and bustle about it. Such sun, such light and shade. The Rue Cannebière is a marvel of cosmopolitanism. I believe all the races of the world move up and down that scintillating thoroughfare. Then there is the Bodega where one can sit on the tall stool and sip the apéritif in charming surroundings and company. There is the English tea room, so chic, so "Fif-o'clock" and *so* entertaining. Up and down the Rue move the motley crowd, Hindoos, Russians, Chinese, Spaniards, Portuguese, Frenchmen, Genoese, Neapolitans, Venetians, Greeks, Turks; descendants of all the builders of Babel, come to trade at Marseilles.

When tired of the city one could climb to Notre Dame de Lorette, that wonderful church looking out over the blue sea. One visited cinemas, the dear old silent ones, and improved one's French by watching the story and

reading the captions. The war was a noisy affair, but imagine what a war *and* talking pictures would be like!

So the days dragged on in this lotus-like existence and one felt ashamed and thought of the Ypres salient and wished to be back there *doing* something. I noticed that this introspective war feeling, this inferiority complex, because one was not in the danger area, only affected those who *had* been there. The men who came straight from England and had never been in France had none of this feeling at all; in fact they were enjoying themselves. They liked this pleasant little Continental trip and didn't care much how long it lasted. But there, I wrong some of them. The most senior man we had was a Harley Street consultant, *and* on the staff of a large teaching hospital. To those who know, there is a lot of meaning in the *and* above. He fretted and fumed at all this delay in getting to the Near East. He considered his time was being wasted and the good work he could have been doing in London galled him. But "C'est la Guerre." So there we waited. To beguile the time I got thirty-six-hours' "War" leave and went up to Nice. As I was in uniform the gaieties of Monte were closed to me. I was allowed to peep into the Rooms through the glass doors, but not allowed inside—I wonder why? I studied those quaint little old women in rusty black clothes of a distant era, who pop into the rooms for twenty minutes, pop out again, plop down on the settees in the anteroom and make up their little black books and then pop out into the world outside again. The day's work done and the pension secure for another week. What a life! Another ten days' waiting in Marseilles and then sudden and secret orders to embark. A fine ship this time, a Canadian Pacific liner and as comfortable as in peace time. My Registrar and I and another O.C. of a General Hospital occupied a deck cabin with bathroom attached; such luxury! Once outside the boom we started off south at full speed, zigzagging steadily to worry any U-boat trying to get us. Beyond the strict discipline against showing lights at night, the daily boat drill, the wearing of kapok waistcoats from the great naval house of Gieve, sea-life was quite normal. On board we had officers and soldiers from a hundred units, and a large number of nursing sisters with their juniors, the V.A.D.'s. It was rather pathetic to watch the pleasure those girls took in this voyage; to them it was a great lark, great fun, but beneath all this feverish gaiety lurked the ever present fear of tragedy.

All boat accommodation was carefully detailed. My particular exit in case we were suddenly launched on the deep was a raft. Each morning we practised the men in getting this oval bath-tub sort of thing down on to the deck and seeing that all the paddles and fitments were in correct order. I gathered that once at sea I should have a nice loop of rope to hang on to while the rest of me was supported by the waters of the Mediterranean. It was a cheerless prospect for a middle-aged gentleman to envisage, but there it was, better than floating around alone in a kapok waistcoat!

We sailed over summer seas and past the Isles of Greece. The captain's

ruse to dash south from Marseilles until well out to sea before bearing east past Sardinia and Sicily answered; the poor "Transalvania" had kept close in to the Italian coast and met with disaster. I daresay our plight would have been worse if sunk miles away from land. But the risk was worth taking, and it came off. We entered the most dangerous part of the voyage on turning north through that swarm of islands in the Ægean; plenty of places there for a U-boat to lurk and wait for us. We had our attendant destroyers, Japanese, half way, and they were relieved by British from Malta. Great little chaps these destroyers, moving along steadily on each side of us, or suddenly putting on a spurt and going right ahead as if they really saw something to chase, or taking a quick dash to port or starboard as the fancy seemed to take them. Sometimes at night they closed in to bellow orders about lights being shown; these remarks would be terse and to the point and were instantly obeyed. And so on a fine May morning we slipped through the boom at Salonika and came to anchor. I looked over the side at that shut boom barring out the deadly U-boat and said to myself, "Thank the Lord for that." I was very glad to feel that we had got through safely. I hated the notion of all those young women on board in such a dangerous position, and I know the Captain did.

As usual on arriving on military affairs after a long and arduous journey, the port people didn't seem to bother about us much. People on a troopship think there are anxious souls awaiting them on shore; embarkation officers standing by to dash out in spluttering little launches to carry hearty greetings from the G.O.C., and earnest prayers to come ashore quickly and help them to get on with the war. What happens in real life is that you come gently to anchor somewhere at some special bit of the harbour, then the engines cease from travail and the ship becomes strangely quiet. The knowing ones select a quiet corner, a book, a pipe or cigarette, and rest peacefully while the resting is good. The eager ones rush up and down the deck, gaze at the shore, stare at the ships near them, pick out special buildings ashore and ask bored ship's officers what they are. At Salonika this is easy: a flat shore with the main thoroughfare an esplanade on the sea front; shops, hotels, &c., on the front; deep water right up to the street where the trams go clanging along; and La Tour Blanche dominating the whole. At the back small hills rising covered with a jumble of houses, and farther back arid brown, naked-looking bigger hills.

At the E.S.O.'s office a tired-looking officer unbelievably sallow-complexioned languidly picked up a 'phone. "S.N.O. speaking, XXX just in, want her disembarked to-day?" "Yes please, 4 p.m. if poss." "Right oh." At 4 p.m. a surprising sight in the shape of a Thames penny steamer of by-gone days edged up alongside our ship and disembarkation commenced. I looked out for the E.M.O. and discovered from him that I was to disembark all my unit as soon as we could get it done, the men would go to a place called Summer Hill, another rest camp of course, and officers would go to a convalescent camp to which they would be attached until

such time as our hospital equipment could be dumped for us at the site chosen for our hospital to function. "Where are we going to settle?" I asked. The E.M.O. pointed vaguely at the arid hills and said, "Somewhere up there, I think." The female nursing staff (horrible expression) were to be distributed among various other hospitals until we could find a home for them. By 8 p.m. we were ashore and bounding over pot-holed streets in a rickety ambulance. We climbed out of the town past a dreary untidy cemetery and went out into open country, all very dry and dusty, and bumpy. Arrived at a sea of white tents which proved to be the convalescent camp. Here we were allotted to bell tents. I put my valise on the ground and realized the war had commenced again for me. We messed with the O.C. Camp. He was not a jovial soul. One could see he resented our being dumped on him and did not try to hide it.

The next day the A.D.M.S. Base arrived to see me. He said I was to pick out a bit of the surrounding country and put up a General Hospital on it. Now a General Hospital accommodates 1,500 patients, has a large staff of doctors, R.A.M.C. personnel and "female nursing staff." With all its side shows of administration block, surgical and medical blocks, kitchens, baths, X-ray, laboratories, operating theatres, massage, sisters' quarters, officers' quarters, men's quarters, incinerators, latrines, &c., the hospital would want quite a considerable slice of Macedonia. The A.D.M.S. took me along in his car and only half a mile up the road there was a building hidden in trees and surrounded by a high stone wall. I was told it was a monastery and a health resort for monks who lived in Salonika. "If the people of the country think this a good place why not take a pitch alongside?" I suggested. The A.D.M.S. agreed and we got out and measured the land available. It was softly rising ground getting steeper as it ran up to some quite high rocky hills at the back. I looked at the trees round the monastery, they seemed cool and inviting in this arid parched country and I plumped for the site. The A.D.M.S. was quite content to get rid of me so soon; he promised tents for the R.A.M.C. men and officers, and the whole of the hospital tentage, baggage, equipment, would be dumped at the side of the road and I was to get on with it. He was as good as his word and in twenty-four hours we had our mess going, the men established and started work on clearing the site of the short scrub brush growing all over it. I had the best Registrar in the world and with his assistance we got down to it and did marvels in a few days. Officers worked with the men in shifts from 6 a.m. till dark. Lorries arrived and dumped the immense baggage required to fit up a large hospital. We got the sisters' quarters laid out and put up their mess and living tents. All our tentage and equipment was perfectly new stuff straight from home and our tents were the splendid Indian pattern with three walls, outside white canvas, then a red layer and an inside yellow lining; topping tents, cool in summer heat, and sturdy in winter storms. After mud, slime and dirt of front line war conditions in Flanders it was rather fascinating to be engaged in

erecting a clean, speckless, shining white city of a hospital. It did look attractive. But not so easy as it looked. Each marquee wanted a skilled batch of men to erect it; innumerable poles, pegs and ropes must all be fitted into exactly the right place to obtain the correct lining and stand of the tent. If correct each tent stood white and solid as a house, if incorrect the tents would be lop-sided and like nothing on earth.

In the midst of this turmoil arrived one afternoon, a hot afternoon, a small peppery little man who turned out to be a medical staff officer of high rank. We had been working from 6 a.m. and had shut down from 2 to 4 p.m. It was all hard manual labour in a hot climate for unacclimatized men, and I had found a rest to be necessary. In blows this angry small man and raises Cain about "no work going on." My gallant Registrar found him first and high words arose. The Registrar was a bit truculent himself and talked back; finally smiled in what the Army calls "a sarcastic manner" and put the lid on it. The great man was speechless with fury when I arrived. He cursed us up and down, told me we were a lazy lot of loafers, etc., and said he "your Registrar smiled at me." I said I was sure he would not do that; he usually carried a sort of smile all the time, he was a very fine officer and so on. At last, semi-pacified, the great man strode off to his car vowing that I would be broken on the wheel, everybody would be broken on the wheel, if the hospital was not complete and ready to receive patients in some absurdly short time, knowing full well his order was impossible to carry out. Later, I learned that this was the way of the little man. A stormy first meeting put the wind up everybody properly, an order to complete such and such a job in seven days that he knew would take fourteen, then turn up again on the fourteenth day to find the work completed. And during the extra seven days the individual concerned lived in terror of the authorities' sudden arrival. He drove his people hard to get things finished; very clever, but one learned this dodge of his as time went on and discovered the bark was loud and strong but the bite was not as bad as the bark promised. Still, it is an invariable way of success to one who has to account for his doings to higher authority.

Then the great day arrived, when we were ready to take in patients. All nursing staff was settled in and I was lucky in having a positively first-rate matron. Alas, she left me later and passed on to giddy heights of eminence finally. The matron of a military or civil hospital in peace time has an arduous, but cut-and-dried job. She deals with hospital-trained probationers to be turned into nurses and sisters. In war she finds herself in command of as mixed a bunch of femininity as you could imagine. First comes her immediate staff of trained sisters, secondly a mob of young amateurs from all ranks of life, the members of the Voluntary Aid Detachments, or commonly known as V.A.D.'s. On the whole a difficult lot of young women. They came from the castle, the country house, the rectory, the homes of retired colonels and commanders,

homes of doctors, dentists, lawyers, business men, shop-keepers, hotels, every walk of life. Young, keen, eager to learn, but difficult to drive, independent and out-spoken, cheery, hard workers, full of pluck, and very good sorts. But think of the woman who was to rule and control the work, the play, the life of such a mixed bag! And in a wild and foreign country it takes a strong head and a warm heart to gain the confidence, respect and liking of ninety women under such conditions. But my matron did it easily.

I proudly announced that all was prepared and we were ready for work and G.H.Q. replied at once by sending me two huge convoys of sick and wounded. They filled us up to the last bed in one fell swoop. It was a bit of a trial, as of course we found out lots of little details we had not foreseen and had to improvise rapidly. It turned out afterwards that G.H.Q. had made a small error, they only meant to send us one convoy but by a slip we got two. They apologized handsomely for it and on the whole it did us a lot of good, as we discovered all the little defects we had overlooked. Never again did we fear any influx of patients up to any reasonable extent. Our tented city became a busy hive of industry. A 1,500-bedded hospital can get through a lot of work in the day and one finds something extra to do daily to make some improvement.

I forgot to mention that during our time of hard work getting all ship-shape there occurred the great fire of Salonika. We were too busy to take much notice of it. I did not go in to look at it, but we could see the glow in the sky for days. Lots of people came along to tell us tales of the great fire. How it began up in the Turkish quarter on the hill. How the hotels on the front went on with their daily life, the lunchers lunched, the jazzy bands played, the bright young people danced while Salonika burned. How G.H.Q. went on quietly working away at files and got on with the war up on the Vardar and the Struma. How the flames spread down the hill to the big houses in the town. The stampede that ensued, shop-keepers madly throwing out their goods into the street. Wild offers for cabs, cars, lorries, anything to take away the valuable merchandise. Fortunes made in a few hours by loot, or by charging exorbitant prices for the moving of a householder's goods. Subsidiary offices of G.H.Q. were on fire almost before the clerks could move the files, the type-writers and the office furniture. The weird scenes during the night when the whole front, the big hotels, and the big merchant houses blazed. True to type the British Army turned out with every available vehicle, and cheerfully and willingly rescued men, women, children, household goods, contents of shops, jewellery and costly carpets, rugs, ivories, ambers, all the treasures of the East stored away in the dark little shops of the Spanish Jews, the Armenians, Turks, Greeks, Levantines, all and sundry. The British soldier as usual took charge. Pulled down houses to check the fire, directed traffic, calmed the excited populace, and in general did every-thing that could be done, all in the day's work. When the fire was over

there was only one nation that stood high in the opinions of that polygenous crowd and it was the British. They told me a common trick carried out by the lower class Levantine was to bargain for a load to be salved, money down, drive a few yards away with a loose wheel, let the wheel come off and upset the cart, let the stuff lie there and be back quick to some other frantic customer. Quick work and quick returns! When I did visit Salonika some weeks later it was a sorry sight. Practically all the houses on the front were burnt-out shells. That was in June, 1917. It looked the same in 1919. I don't know if it has ever been rebuilt.

Gradually our hospital life settled down to a steady routine. As the summer advanced the work became heavier. Macedonia is a pest-house of malaria. One can understand the teeming miles and miles of swamp and rushes at the mouths of the Vardar and Struma being an inexhaustible fount of malaria, but even in those arid hills every little stream was full of anopheline larvæ, breeding in their thousands of millions to produce the deadly anopheles mosquito. The war in Macedonia was really a doctor's war. The cold months were healthy. But every year from June to December the fight lasted. Down from the front came malaria cases in their thousands. Thousands contracted it in Salonika. The local population were sodden with malaria, died in droves year by year, but—took no notice. It had always been so. "God is good and Mahomet is his Prophet: Kismet." The Greeks were just as lethargic as the Turks.

But we worked and worked, Heavens how we did work! In our part of Macedonia we concentrated on those tinkling little streams that ambled so innocently down the hill sides. Every little rocky pool held its myriads of larvæ. We blasted, cut, dug, canalized miles and miles of country. We slept under nets, rubbed ourselves with oils, unguents and essences. We made the nurses and orderlies on night duty wear nets covering the face and head, loose gloves to protect wrists and hands, and high boots or putties to protect the ankles.

Salonika malaria is a nasty type, the worst I know except that in Mian Mir in the Punjab; an attack relapsed and relapsed until the poor victim was yellow as a guinea, bloodless, listless, emaciated, and fit for nothing but to send home. But that was the tragedy. In 1917 submarines were so active in the Mediterranean that all sailings of hospital ships were cancelled. As one of the consulting physicians dramatically stated, "If you get sick here you have a very good chance of dying for your country, but not of seeing it again." So naturally the sick increased steadily. From the line to base hospital, from hospital to convalescent camp, from camp to line and so back to hospital. That was the continued history of many a man in the Salonika force for those years. Then again we had to take daily, or twice weekly, doses of quinine. I had to set an example and do it, though I knew from former experience in West Africa that I could not do it. It only made me wretched and shaky. But it was the order and had to be carried out.

Frequently I toured the hospital at night to see if the men had their nets

down. Every human being hates a mosquito net round his bed in a hot climate. It shuts out the air and makes him feel smothered and hotter than ever. So the first instinct of the uniformed man is to turn up the net and get some air. But that means certain exposure to mosquito bites and certain malaria. If you want to escape malaria you must just stick it. I have stuck it in West Africa, Salonika, India, and have never had the disease. Soldiers are very curious about these nets. One soldier found with his net up was asked why he had done that. He replied, "Well, sir, I put it down three nights running, caught nothing, so I thought it was no blinking good." The matron had to worry the nurses and V.A.D.'s to make them use their nets; one somewhat elderly lady refused to use a net as she considered it was not right to do so. She said she was in God's hands and He would look after her. "And I suppose," said matron, "you expect the good God to detail a couple of angels to sit by your bed all night and keep the mosquitoes off." The malaria amongst our nursing staff was very much less than that in the hospitals down in Salonika.

I think our position was pretty healthy and the monks were right in siting their summer monastery there. As summer advanced the said monastery filled up and trouble began. The two senior officials were grave and reverent gentlemen in soutanes and had long black beards; one we called the Abbot frequently came to see me on matters of importance.

Once the Abbot approached me in almost an apologetic way. Some of my V.A.D. girls were attracted by the cool green shades of the tree-lined paths in the monastery grounds and, of course without asking anyone about it, they took to strolling in at the back gate and wandering about the grounds. Also, along the paths promenaded the young priests out from Salonika for the benefit of their health. The Abbot was so tender about it, but "Figure to yourself, Monsieur le Colonel, the young men are here for rest and recuperation of mind and body, the ladies are of the most charming, but the sight of such beauty is at times disturbing to the mind of the younger candidates and in effect, monsieur, surely interferes with their meditations." The old man stroked his flowing beard and his black eyes twinkled at me. So the gate of the green paradise was closed to the disturbing female element, and the young priesthood presumably meditated in peace of mind.

One of our medical officers was full of knowledge about stage-craft; in London he was in close touch with the theatrical world, so he offered to build us a theatre. It seems a large order, but what it really meant was the building of a stage with overhead cover and suitable approaches, dressing-room tents and lighting. The auditorium was the open ground in front and with camp chairs and benches we could seat an unlimited number. Our actor-doctor made a splendid job of it, painted all the scenery and drop curtains, and from a lorry-run plant supplied full electric lighting devices. Our theatre became famous in Salonika and every concert party in the Army was willing to come and give a show at our hospital. And jolly good shows

they gave us. It was pleasant to sit out there in the cool of the evening under the dome of scintillating stars, and listen to the old songs, all choruses heartily sung by the hundreds of patients in their hospital blue. I think at that time, 1917, the popular songs were "Good bye-ee," "The long long trail," "If you were the only girl in the world," "Take me back to dear old Blighty" and a very popular one called the "Phantom Army." In some of our concert parties we had well-known artists, notably Jock Mackay the Scottish comedian. Jock was in the M.T. and I rather think he used to drive out the lorry bringing the concert party, give his turn, which lasted as long as the audience could keep up encoring, and drive back to his camp after the show. Long life to Jock, he did his bit in cheering up the Salonika Army. One popular local song sticks in my head still. It was this :—

> Hurrah, hurrah, the troopship's in the Bay,
> Hurrah, hurrah, we're sailing home to-day,
> We'll wake the blinking echoes from the Struma to the sea
> When—we—leave—Salonique.

The concert parties were a great blessing to the sick men. Something to look forward to during the week, and as 90 per cent of our patients were malaria cases, weak and worn down by many long bouts of fever, and depressed by long courses of treatment with that potent but depressing drug, quinine, a little cheerfulness of mind was a great tonic. Perhaps the entertainment side of such a dull war as the Salonika front was in some way overdone. I remember a medical officer who had spent all his time both in France and Salonika as a regimental doctor coming to us for a rest. On going to his ward next day he was astonished to find all the beds filled with young men wearing their hair very long, well greased and brushed back in a fascinating sweep to the nape of the neck. Accustomed as he was to soldiers in the line with closely cropped hair he was astonished to see these elegant looking young men and he asked the R.A.M.C. serjeant "What are all these men, serjeant, are they soldiers?" Oh yes, sir, replied the serjeant, "they all belong to the Buttercup Concert Party." "Good God," exploded the soldierly M.O., "they look to me like a lot of b——y artists!" As a matter of fact these "artists" were 1915 Salonika men and chock full of malaria; many a man was shaking with fever as he went on to do his turn, and all this night-work did them no good.

As the summer advanced, up and up went the sick rate. August and September were the worst months and the hospital was filled to the last bed daily. The Salonika type was a very unpleasant form of malaria; you either got what was somewhat strangely called "benign tertian fever," which was so far from acting benignly that it went on relapsing and relapsing until the victim became the true Salonika type, gaunt, haggard, sunken-eyed and of a peculiar earthy yellow colour, or you got the "malignant tertian fever" which acted so malignly that it could strike you down

suddenly into a state of coma or deep unconsciousness—and you just flickered out. Solutions of quinine injected into the veins in heroic doses was the only way to save such cases. In less severe cases quinine was injected into the muscles. I shudder to think how much of the drug some of the most resistant cases received. Our nursing staff, male and female, suffered badly. Necessarily they did, as their work was always in the midst of a vast supply of the malaria parasite in the blood of the 1,500 patients and the countless host of the anopheles mosquito carrying the parasite from patient to victim. And of course they had to work at night. Long hours of duty, walking through the long wards and moving about in the open all night; and the night was filled with mosquitoes as well as with stars.

(*To be continued.*)

Editorial.

THE STATE OF THE PUBLIC HEALTH.

In an Editorial last month we dealt with the first four sections of Sir George Newman's Report at considerable length; the remaining twelve sections we must summarize briefly this month. A good deal of the matter refers to administrative action which, while of first importance to Medical Officers of Health, is not of very great interest to our officers.

In the section devoted to Tuberculosis the measures for the prevention of this disease are divided into (*a*) general and (*b*) special. The general measures include all means by which the conditions of life are improved among the people: better food, improved housing, amelioration of conditions of labour, diffusion of knowledge of the laws of health, value of fresh air and ventilation. The special measures include diminution of indiscriminate spitting; schemes for the diagnosis of tuberculosis; treatment in dispensaries, hospitals and in sanatoria; village settlements and isolation of infectious cases, and after-care propaganda.

The death rates from all forms of tuberculosis per million of population in 1930 were: males 1,037, females 770. The death rates from pulmonary tuberculosis were: males 863, and females 624. These are the lowest ever recorded in this country. The deaths from non-pulmonary tuberculosis are half of those in 1918.

Efficient notification is of primary importance as it forms the starting point for all measures directed to prevent the spread of infection. Notification is most imperfect at the extremes of life. It is estimated that fifty per cent of children who die from tuberculosis in early life die from tuberculosis caused by tubercle bacilli of human origin, probably acquired in the home. If the child's case is notified, steps can be taken to find and treat the infecting case and prevent the spread of infection to other children.

More and more use is being made of beds in residential institutions for the observation of suspected cases of tuberculosis, with a view to diagnosis. In about forty per cent of the patients treated in residential institutions, tubercle bacilli have never been found and the figures suggest that adequate search has not been made.

In children, there has been too great a tendency to diagnose pulmonary tuberculosis on insufficient grounds. An inquiry made in Lancashire by a tuberculosis officer showed that about sixty per cent of the children referred for examination as tuberculous were found not to be tuberculous, nor did any of these children in the young adult age (15 to 25 years) again return

to the dispensary as tuberculous cases. Dr. Burton Wood, consultant in pulmonary tuberculosis to the Essex County Council, writes "the children of the dispensaries and sanatoria are not the children who develop tuberculosis in adolescence. A history of pre-tuberculous childhood is practically unknown among adolescent consumptives."

Sir George Newman considers that the tuberculosis officer should employ all known means to make an accurate diagnosis, e.g., physical examination, temperature range, examination of sputum and fæces (too often omitted) for tubercle bacilli, X-ray examination and tuberculin tests. He should never hazard a diagnosis on the strength of a doubtful shadow in an X-ray film, or so-called hilum tuberculosis.

Attention is drawn to three developments of after-care work. At the Fazakerley Sanatorium advanced cases are maintained under institutional control with a view to the safeguarding of the outside community. There are hostels at which ex-patients receive board and lodging and are employed in suitable occupations.

At Sheffield housing is regarded as a most important factor in the control of tuberculosis. The County Council have a scheme for the re-housing of the families of infectious patients. They insist that the patient shall occupy a separate bedroom and that no lodgers shall be taken. The liability on account of this scheme per patient was about the same as four weeks' treatment in a residential institution; and against this must be put the cost of treating such patients for unknown periods in an institution had they remained in their former houses.

The Burrow Hill Colony was opened by the National Institution for the Prevention of Tuberculosis for the treatment of youths between the ages of 14 and 19. The idea is to treat the patients under conditions of discipline, occupation and recreation suitable to their age. It is considered undesirable to treat youths with adult men or with children.

There seems to have been a change in the type of tuberculosis since the war. Acute miliary tuberculosis and acute broncho-pneumonic varieties are rarely seen now. The fibro-caseous type slowly spreading from the apex through the lung does not predominate as it used to do. Instead, there is frequently found a rapid involvement of a part or the whole of a lobe by a broncho-pneumonia, with high temperature, which, however, does not kill the patient, but simmers down, the patient being left with a lung heavily diseased.

The number of deaths per million from cancer in England and Wales recorded during the year shows an increase, being 1,454 compared with 1,437 in 1929, and 1,425 in 1928. Sir George Newman considers that this annual increase in mortality should not be regarded as a *growing* inability to control the disease. In the absence of any striking improvement in methods of treatment, such an increase may be expected in consequence of the higher average age at death of the population, and greater diagnostic

ability to recognize the disease, especially in the deeper-seated organs. The Registrar-General for Scotland from his studies of the increase in the national cancer death-rate deduces that three-quarters of the recorded increase in recent years could be ascribed to the ageing of the population, greater numbers being alive at the ages which are liable to cancer.

The Ministry's Departmental Committee appear to regard cancer as the local response on the part of the tissues to the application of an agent to that area of tissue. The fact that the removal of the local lesion may be followed by complete freedom from the disease, seems to point to the conclusion that whatever more general factors may be involved, the one of primary importance is the local lesion in the particular organ concerned. If this conception be true it brings the subject of cancer more within the scope of preventive medicine than is usually supposed to be the case.

The prevention of acute rheumatism in childhood, the most prolific cause of heart disease, is one of the ideals of the Public Health Service, and its essentials were indicated in Sir George Newman's Report to the Board of Education in 1912. In 1919 the Invalid Children's Aid Association opened the Edgar Lee Home at Willesden for the treatment of boys with heart disease, and in 1924 the same Association opened the Kurandai Home at Hartfield for girls and boys (3-7) suffering from rheumatic heart disease. In 1921 the Corporation of Birmingham converted their residential cripple school at Baskerville into a home for the recovery of rheumatic children. In 1930 the London scheme for dealing with the disease was established, and under the Local Government Act the beds in hospitals under the Boards of Guardians and the Metropolitan Asylums Board were transferred to the London County Council, who already provided the School Medical Service clinics and the greater part of the special rheumatism supervisory centres.

In the Ministry's last Report the three chief aims—ascertainment, supervision and treatment—of an efficient scheme for the prevention of acute rheumatic infection in children were indicated. Compulsory notification was tried in three London boroughs, but has not proved an unqualified success owing to the protean nature of the disease. The London County Council rheumatic register contained 16,911 names, 6,598 being boys and 10,313 girls. Since the inception of the scheme 1,700 cases have been diagnosed as acute rheumatism : 40 per cent of first attacks occurred within the same three years, 6-8, and 29 per cent in the 7-8 year old period. A family history of rheumatism was more frequently met with in children whose first attack occurred before 8 years, whilst home environment was recorded as a cause when the disease began after that age.

From a study of the cases at the supervisory centre of the Borough of Kensington, Dr. Fenton says that the statistics support the view of Glover that the incidence of acute rheumatism increases directly with poverty,

malnutrition, overcrowding and bad housing. The Kensington figures do not show that tonsillectomy is of any great value in preventing the onset of rheumatism in children, but it does appear to modify the severity of the disease so far as heart disease is concerned. This modifying effect does not seem to apply to chorea.

As in the past, the treatment of acute rheumatism in children consists in absolute rest in bed and the administration of salicylates. The period of rest has been extended of late years. In the London County Council's hospital for children at Carshalton every child is nursed in bed for three months, and the total period of treatment is at least six months. School work is carried on in the wards, and when allowed up the children have exercises, play games and dance. When discharged from hospital the children are still kept under observation at special rheumatic clinics and by the school medical officers.

Opinion in this country and in America seems to be turning to the theory that acute rheumatism and its relapses are due to the sensitization of the tissues by the disintegrated products of streptococci usually absorbed from the tonsils either gradually or during attacks of tonsillitis. An attack of tonsillitis after this sensitization has taken place will be followed by a fresh rheumatic manifestation or a relapse. Dr. Glover has recently demonstrated the relation of epidemics of acute rheumatism and of tonsillitis, the peak of the rheumatic wave generally following the peak of the tonsillitis wave after an interval of two to three weeks. Ker has found that patients who have had rheumatic fever, and subsequently have an attack of scarlet fever, generally suffer from an attack of acute rheumatism when in a fever hospital. In the case of a rheumatic child the recurrence may be serious and attended by carditis. Recent work seems to raise the question whether a rheumatic child should ever be admitted to a scarlet fever ward.

The returns from the Venereal Treatment Centres for 1930 indicate that the great majority of cases of syphilis resort to these centres. The rapid decline in the incidence of syphilis after 1920 ceased in 1925 and since then the incidence has been more or less stationary. This agrees with the experience of a number of countries in Western Europe. The decline in the certified deaths from syphilis of infants under one year of age has continued; the deaths per 1,000 births were 1·34 in 1912, 2·03 in 1917, but only 0·55 in 1930.

In 1920, 42,805 cases of syphilis attended at the treatment centres; in 1925, 22,588 cases attended; and in 1930, 23,120 cases attended.

New cases of soft chancre have shown a tendency to increase during the past three years. The disease is seldom seen in purely inland centres in this country, but in dock centres the percentage of cases of soft chancre in 1930 was 6·7.

The numbers of cases of gonorrhœa reporting at the centres seem to be

slowly increasing, but the proportion of females to males is 1 to 3·9, indicating that the disease is ignored by females. If a high proportion of women could be brought under treatment, the incidence of the disease could be reduced materially, as a female with gonorrhœa can be rendered non-infectious by treatment more quickly than can a male. In the absence of a specific remedy for gonorrhœa, like arsenobenzene for syphilis, the most hopeful line of attack is intense propaganda to induce women to resort more freely to skilled treatment.

As regards the diagnosis and treatment of syphilis, Sir George Newman points out the importance of early diagnosis by means of dark-ground illumination and serological tests. The diagnosis of primary syphilis on clinical grounds alone is regarded as quite indefensible, as early and continuous treatment is of the first importance not only for the individual but for the State. At the recent Congress on Dermatology and Syphilology held at Copenhagen it was recommended that all sera should be tested by two methods, a Wassermann test and a reliable and sensitive flocculation test. At the Montevideo Conference, a comparison of the Wassermann test with the "standard" Kahn test, as performed by its author, showed that the latter test was more delicate and yet specific.

Under the Local Government Act of 1929, County Medical Officers have to consider schemes for isolation hospital purposes. Facilities for rapid road transport and increased use of the telephone service have altered the factors which governed the planning of isolation hospitals thirty years ago and a hospital can now serve an area many times larger than formerly. A large hospital can provide whole-time employment for a resident medical staff who are always available to receive patients and to apply urgent treatment, when necessary. Small hospitals are often empty for prolonged periods and it seems extravagant to keep up any considerable nursing staff in them. Hospitals serving large areas are less liable to fluctuations and may be recognized as training schools for the nursing staff. In a large hospital with a number of ward blocks and a good proportion of single cubicles, it is possible to treat a greater variety of diseases.

The proportion of one isolation hospital bed per thousand of the population was mentioned in a Local Government Board Memorandum as a useful guide, but the Ministry now consider that the desirable proportion in any particular case should be estimated after considering the age distribution and occupation of the population, the past experience as to the incidence of infectious disease, housing, etc. Where home treatment has been the custom and housing conditions are suitable, the Ministry consider that there is no reason to press for extensive hospital provision for the treatment of mild cases of scarlet fever. But for the treatment of severe cases of smallpox, some hospital in an isolated position should be available, as experience has shown that infection may spread if the hospital is in a populous district. For a county, one such hospital may be sufficient.

In the section of Sir George Newman's Report devoted to the relation of food to health and disease, it is stated that the malnutrition of the school child in this country has declined in a single generation from approximately ten per cent to nearer one per cent, and this remarkable change is due to the medical care of the school child, supplementary feeding at school, improved social conditions and the higher wage in the home.

There is still much apathy and ignorance as to the choice of foods and deplorable inaptitude in cookery. Professor Cathcart observes, "We do not suffer so much in this country from the inability to obtain food, as inability from one cause or another to utilize to the best advantage such foods as are available."

With regard to the bacteriological standards of the various grades of milk, the Ministry recognize that the present methods of examination, i.e., the agar plate count and coli examination, do not always yield results which correspond with the keeping qualities of the milk. An inquiry into the whole subject of bacteriological standards for graded milk has been instituted at the London School of Hygiene and Tropical Medicine.

Attention is drawn to the need for careful supervision of materials used in the manufacture of dairy equipment and especially to the wood pulp discs employed on milk bottles. There are now on the market discs made from inferior pulp hardened with glue. These discs are not subjected to effective heat treatment as are the better types impregnated with wax, and when in contact with milk become soft and pulpy and may be a source of contamination.

In an Editorial last year on Bovine Tuberculosis in Man, we reviewed the main facts as regards milk and tuberculosis, and the means which might be adopted for the prevention of this source of infection. The importance of pasteurizing milk was therein emphasized.

The fumigation of foods with hydrogen cyanide (hydrocyanic acid) for the destruction of insect pests may be a source of danger owing to the excessive absorption of the gas by the foods. Dr. Monier-Williams has investigated this subject and has found that the amount of hydrogen cyanide absorbed and retained in foods is influenced mainly by: (1) the strength of the gas and duration of fumigation; (2) the moisture content of the food; (3) the state of subdivision of the food; (4) the method of packing; (5) the period of subsequent ventilation. Foods treated with not more than 1 volume HCN in 200 volumes of air and subsequently exposed to air, do not usually contain more than 20 parts of HCN per million. Ventilation and exposure to air after fumigation is of great importance in reducing the amount of hydrogen cyanide in the food. Milk is an exception to the rule and even after aeration and heating it still retains a large proportion of the HCN absorbed. Minced meat has a fairly high absorptive capacity, while among vegetables green peas and runner beans take up more than do onions and potatoes. The skin of oranges

and apples is resistant to the passage of gas, while that of peaches and bananas is more readily penetrated. Closely-packed foods absorb gas slowly—in a sack of flour only the outer layers contained any considerable quantity of cyanide. Effective fumigation of packed foods will require high concentration of gas and prolonged exposure. When the gas has penetrated butter and cheese, it is not readily lost on exposure to air.

With regard to the toxicity of hydrogen cyanide Lehmann states that 10 to 12 milligrammes may be taken by an adult without injury, but 60 milligrammes constitute a fatal dose. It is possible that when disseminated in food its toxicity is not so great, and according to Jitta 400 to 450 parts per million is the maximum amount allowable for an adult.

The majority of observers consider that the consumption of fumigated food is not dangerous. We have seen that when the normal concentration does not exceed 1 in 200, well ventilated foods do not contain more than 20 parts of HCN per million. Special care must be taken with such foods as milk, sausage or minced meat, dried fruit and green vegetables, also when high concentrations or long exposures to the gas are adopted.

Hydrogen cyanide may be retained by foods which contain lævulose, with which it forms a cyanhydrin not readily dissipated by air. With foods containing dextrose a cyanhydrin is not formed unless the food is alkaline. Over-treatment with HCN may cause serious damage to fresh fruit and vegetables owing to interference with the natural process of respiration of the living cell. The oxidation processes appear to be particularly sensitive to the action of HCN. Over-treatment may also affect some of the factors associated with the living plant found in fruits and vegetables, which are so essential to health. More information is required before an opinion on this point can be given, but over-treatment is obviously to be deprecated.

Ethylene oxide has been used for fumigation in the form of a gas in the proportion of 2 lb. per 1,000 cubic feet of air space. It is reported to combine with water to form ethylene glycol, to be quite harmless, and to leave no taint when applied to foods.

Ethylene and its derivatives have been used to stimulate plant growth, but ethylene chlorhydrin used for this purpose has been found to be definitely toxic.

Spraying vegetables with compounds of copper, arsenic or lead is not free from danger when carried out at a late stage of growth. Some specimens of celery treated with copper were found in the Ministry's laboratory to contain 420 parts of copper per million, and even after washing 26 parts per million were still found.

Dr. Monier-Williams has identified the yellow colouring matter of flour as "carotene," and has shown that in the process of bleaching flour 30 per cent of the carotene is destroyed. As carotene is known to be a probable precursor of vitamin A, the removal of 30 per cent of the protective qualities from flour by bleaching suggests the re-consideration of the whole subject of the treatment of flour by chemicals.

Clinical and other Notes.

NOTE ON THE RELATIVE LENGTHS OF FIRST AND SECOND TOES OF THE HUMAN FOOT.[1]

By Major-General BRUCE MORLAND SKINNER, C.B., C.M.G.,
Army Medical Service (Retired).

Many years ago when a number of recruits was passing under physical examination, it became notable that their feet might be classed under two heads with regard to the prominence or otherwise of the great toe in relation to the second. Some years later, being in another recruiting centre for a short time, the above condition was noticed again and tabulated as follows:—

Number of recruits	1st toe longest	2nd toe longest	1st and 2nd toes equal
323	175	74	74

On finding these notes amongst my papers after a long interval a visit was paid to the Natural History Museum in London, and the following observations were made upon the skeletons exhibited there:—

	1st toe longest	2nd toe longest	1st and 2nd toes equal
Caucasian, F.	—	—	R. and L.
Caucasian, M.	—	R. and L.	—
Arawak, M.	—	L.	R.
Arawak, F.	—	R. and L.	—
Negro	R.	—	L.
Negrillo, F.	R. and L.	—	—
Mincopee, M.	—	R. and L.	—
Tasmanian, M.	—	R. and L.	—
Specimen, rt. leg	—	R.	—
Articulated skeleton, Man, with horse	—	L.	R.

A visit was also paid to the Museum of the Royal College of Surgeons, and the notes tabulated on p. 216 were recorded, omitting such skeletons as were incomplete and querying those specimens which appeared doubtful.

Unfortunately, as now situated it is impossible for me to compare my observations with those which have been published by other observers. I hope that my data will prove of use to some future inquirer. Meantime it is clear that in the British recruits examined by me the first toe is usually longer than the second (54 per cent), whereas, if I may judge from the skeletons of African, Asiatic and American native races represented in our museum collections, the second toe is usually the longer. The longer

[1] Reprinted, by permission, from the *Journal of Anatomy*, vol. lxvi, Part I, October, 1931.

second toe may be regarded as the persistence of a simian feature which has disappeared from a large percentage of white people. Why this change has taken place is a matter for further inquiry.

	1st toe longest	2nd toe longest	1st and 2nd toes equal
9 Europeans	6	2	1
1 American	1	—	—
1 Lapp	—	L.	R.
1 Egyptian	—	—	1
1 Fuegian	—	1	—
3 Peruvians	—	3	—
2 Peruvians	—	—	2
1 Arawak	—	—	1
1 N. Am. Indian	—	—	1
1 Eskimo	1	—	—
1 Iniue	—	1	—
1 Tahiti	—	1	—
2 Java	—	2	—
1 Japanese	—	1	—
1 Aino	—	—	1
1 Bhutani	—	1	—
1 Malay Arch.	—	1	—
2 Chinese	—	2	—
1 Samoyede..	—	1	—
2 Sikh	—	2	—
1 in same case as giant Byrne	—	1 ?	—
1 New Hebrides	—	1	—
1 Andamanese M.	—	—	1
1 Andamanese F.	—	1	—
2 Negro	1 ?	—	1
1 Balumba	—	1	—
3 Bushman..	—	3	—
2 Madagascar	1	1	—
2 W. Australia	—	1 ?	?
2 Australia	—	2	—
1 Tasmanian	R.	L.	—
1 Tasmanian	—	1	—

It may be of interest for readers to know that in the 323 recruits examined 16 had supernumerary nipples, 10 men on the right side, 5 on the left, and 1 on both sides.

A NOTE ON A CASE OF ENTERIC FEVER FED IN AN EXPERIMENTAL MANNER.

By Major H. GALL,
Royal Army Medical Corps.

Lance-Corporal L., of the 2nd Royal Scots, aged 27, was admitted to the British Military Hospital, Quetta, on September 21, 1931, with enteric fever. *B. typhosus* was grown from blood taken on what was, according to the patient's statement, the third day of the illness.

His temperature chart is reproduced, fig. 1, but only the temperature and daily record of stools are given. The case was quite typical. He looked ill and toxic, the pulse was slow, he had somewhat acute bronchitis, the spleen became enlarged and soft. After four or five days he began to have typical enteric stools streaked with blood.

The method of feeding was experimental. From the fifth to the

eleventh day inclusive he received no food except glucose dissolved in water, to which fruit juice and salt were added.

For the first five days he received only five drachms of glucose (glucose syrup) in the twenty-four hours, but thereafter he received four times this amount.

From the twelfth to the fourteenth day he received only glucose and one pound of grapes, without the pips and skins, per diem.

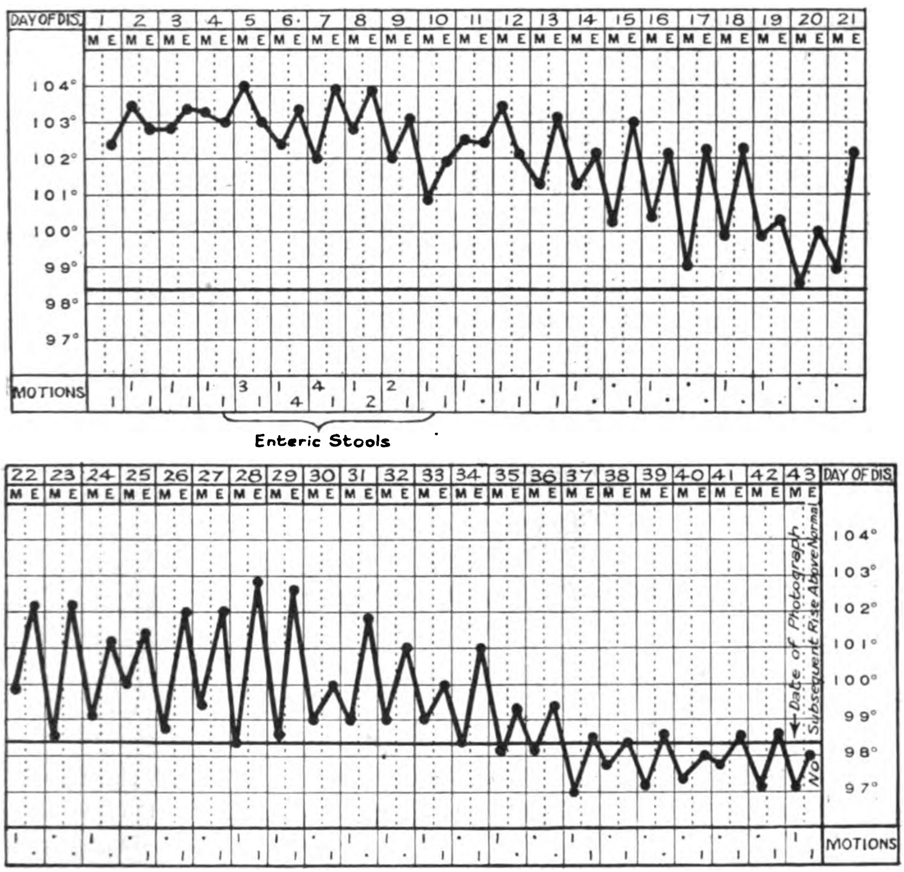

Fig. 1.

On the fifteenth day he was put on to milk feeds containing glucose and was quickly got on to a more substantial diet without ill-effect and, in particular, without increasing the number of stools.

Glucose was given till the thirtieth day. It was then stopped, as it was thought that it might possibly have been causing the somewhat prolonged continuance of the fever. This, however, appeared to come naturally to an end on the thirty-sixth day, and it seems very doubtful if the glucose had anything to do with its prolonged course, which is not uncommon in enteric.

The condition of the patient was highly satisfactory during this somewhat severe and prolonged illness. The experimental diet was instituted largely in the hope of controlling the enteric stools, and they were controlled within four or five days.

The photograph, fig. 2, shows the patient on the forty-third day. It had been arranged that he should be placed in a chair for the occasion, but owing to a display of *jeu d'esprit* on his part he came to be photographed standing up, which certainly would not have been allowed if I had been present. The condition shown by the photograph augurs well for the method of feeding adopted during the most acute stage in this case.

FIG. 2.

We hold strongly the view that any food which calls forth the digestive processes, whether it be barley water, whey, broth, or anything of the kind, almost infallibly aggravates any acute enteritis or colitis, owing to the imperfectly digested meal being hurried through the irritable alimentary canal.

In the broadly parallel case of bacillary dysentery, for example, we agree with those who give, as far as possible, no food during the first forty-eight hours and only water and glucose for two to three, or even more, days after that.

The acute stage of the enteritis in enteric seems less severe than the acute stage of colitis in dysentery, but it is more prolonged. Naturally, in either case one cannot attain the ideal of giving no food until all trace of inflammation has subsided, but even a few days without digestible food seem to give the reparative process a flying start.

In the present case the patient had no food requiring digestion for seven clear days, and after that only one pound of grapes a day for three days longer, as described.

It is a truism to say that little or nothing can be argued from one case, but nowadays typical cases of enteric with enteritis are not common among soldiers.

As regards bacillary dysentery, many approve of some modification of this method which has been well tried out at the British Military Hospital, Quetta, during 1931.

There can be no virtue *per se* in starving those wasting with a long fever, but this treatment is far from starvation when glucose is being given. Many will probably consider that under good conditions the above treatment could not be recommended as a routine. Under adverse field service conditions, when rations and tinned medical comforts provide the fare, and invalid cooking has to be undertaken in unfavourable circumstances, the above method, as a tide-over, is worth consideration. The case is not written up with the object of insisting that this method is specially good as a routine, but with that of showing that it is feasible.

I consider that it would be an advantage to include glucose in field medical supplies. It is useful in many acute illnesses.

I am indebted to Assistant Surgeon A. J. Selvey, I.M.D., for the photograph in the text, and to Lieutenant-Colonel P. C. T. Davy, C.M.G., R.A.M.C., Officer Commanding, British Military Hospital, Quetta, for kind permission to publish this case.

Travel.

BY RAIL AND ROAD IN INDIA.

By Major L. B. Clarke,
Royal Army Medical Corps.

I.—The South.

One of the advantages of military service is the opportunity to travel and see something of the world. Service in India probably provides this opportunity in greater measure than does that in any other country. From the Khyber to Comorin, from Bombay to Burma, the great sub-continent contains within itself such varied scenes and conditions as are without parallel in any other part of the world. The keen observer, be his wanderings by rail or road, has in the course of his sojourns in India ample opportunity for recording an almost endless variety of impressions.

The average Englishman at home, unless he has associations with India, knows very little of the country and it must be confessed at times displays

little interest. How often does it happen that one's friends, having heard that one has been in India, receive the information with either complete indifference or merely temporary interest! "Oh, it must be very hot out there." Agreement is followed by "Well, you know *we* had it very hot the other day." The topic then languishes, but should it by chance persist it will be found that many stay-at-homes can be divided into: (1) those who think that one lives like a rajah in a palace with a hundred servants, and (2) those who think one lives with the "natives."

The happy mean between these two extremes is difficult to explain, and to the uninitiated the description of any circumstance has frequently to be punctuated with words of explanation which tend to mar the narration of one's best stories. After all the Englishman comes out to the East bringing with him most of his paraphernalia of civilization and settles down in an environment which is as English as circumstances permit, and is merely modified by the local conditions of geography, climate, customs, etc. And yet these modifications are the things which matter and make life in India so different from that at home.

The entrance to India is through Bombay. Viceroys and Governors proceed in stately ceremony through the "Gateway of India" on the Apollo Bundar, the rest of us are dumped down at the docks in a seething mass of humanity who appear to be imbued with two objects: (1) to get in your way and (2) to get your money, at least that is the impression of the new-comer. But once through these jostling crowds, what of Bombay itself? After years in the Near East it seemed surprisingly civilized. The great rows of European shops, the big hotels, the Secretariat, the Museum, the Victoria Terminus strike at once a note of emphasis and solidity and one feels that civilization has left its mark. One wanders far afield however into the purlieus of a great city looking for the East and it is not there. Neither in the wealth of Malabar Hill nor in the poverty of Parel is it revealed. No, nowhere in Bombay is there anything of a really Eastern outlook. Morocco or the Near East contains far more of the Orient than does Bombay. And so let us leave this modernized seaport in its humid haze and seek for other places more oriental and less sticky. Less sticky, does one say? Yes, by all means, but let not the traveller imagine that Bombay in all its heat and moisture is a fair sample of what the East can produce. Let him sample Madras when the wind has dropped, Singapore at noonday and Rangoon at almost any time!

The journey up the Western Ghats by day reveals in stark nakedness the black and jagged outline of those erstwhile volcanoes which, running cheek by jowl with the Indian Ocean, poured out vast quantities of lava and so formed the foundation for the black cotton soil of the present day. The lifeless aspect of the gaunt and graceless hills impresses the mind but does not please.

By night, with the construction of the new electric line in progress, the view from the carriage window looking down on to swarms of naked coolies

a hundred feet below, working in the weird light of flares and torches, with cranes poised overhead and the loud rumbling of falling rocks below, was a veritable picture of Dante's Inferno. This, one's first view of the interior of India, made one think.

One's second view was from the carriage window again, seven in the morning and forty miles beyond Dhond, and what a picture! Miles and miles of almost flat cotton soil of the darkest colour, and dust and scrub and occasional villages. Was this the beautiful India of one's imagination? Scarcely could the desert be less attractive.

Two days of this and then the scene changed, for at evening hills appeared on the left, part of the Eastern Ghats, resplendent in the red

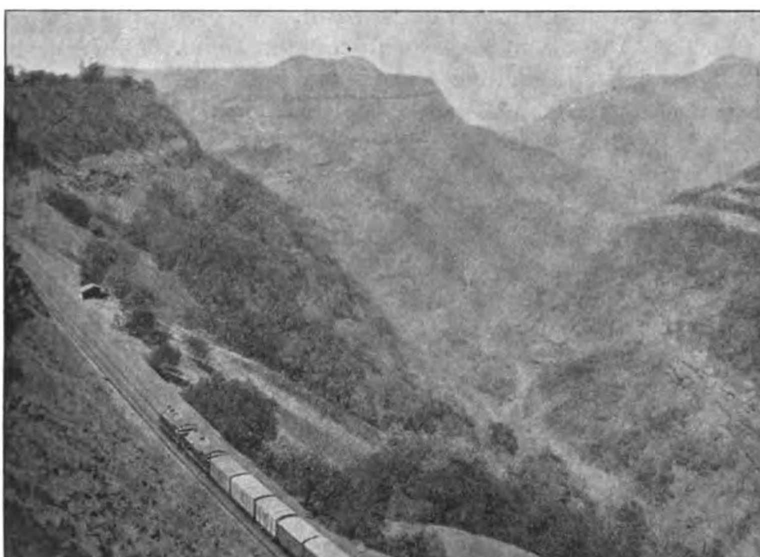

FIG. 1.—The Western Ghats.

reflected light of the setting sun and crowned with all the majesty of a passing thunderstorm.

The contrast with the monotony of the Deccan was most striking and one realized that India is a land of extremes. If she is beautiful she is very beautiful, if she is ugly she is extremely so, and this one notices again and again.

People have often said how uninteresing is the journey from Bombay to Madras. One can tell without the skill of a Sherlock Holmes that they have gone by "Mail." Advise them to go by "Express," and they will modify their views, for the "Mail" passes these gems of sandstone hills in the dark.

Arkonam Junction within forty miles of Madras and one is down at sea

level. The train reverses and climbs painfully through the night up on to the high tableland of Mysore, and at an early hour in the morning completes its 900 miles journey at Bangalore. Thirty-six hours in a place is no justification for description or comment, but the first Indian station which one has seen leaves certain impressions which, as such, are worth recording.

The wide open spaces of a well-ordered cantonment, the absence of a street of shops, the intense glare of the sun, the lofty and cool mess buildings, the dead silence of the afternoon siesta, the continuous and wearisome noises of the insects at night, all these remain permanently in one's memory.

One tends to forget with the passage of time life's little discomforts and the memory dwells rather on the things which are pleasant, but one experience which was otherwise lingers still. It is worth recording if only for the benefit of those who have yet to come to India. The advice received from "old qai hais," that one should never obtain one's tropical kit in England as it is so much cheaper in India, sounds good at a distance. It is, but converted into terms of reality it is the rottenest piece of advice ever given to the new-comer. One travels with troops on arrival at Bombay, and therefore in khaki drill which is all right. In the evening one accepts an invitation to the Club. "What kit?" "Oh, any old kit." One looks around and finds that the old mufti kit is thick English serge quite unsuited to the tropics. One dons this minus a waistcoat and spends the rest of the evening alternately mopping one's brow and cursing one's well meaning but misguiding friends. Twice the durzai's topmost price would one have paid then and there for raiment suitable to the occasion.

The 650 miles journey from Bangalore to Poona on the narrow-gauge railway through Belgaum started at night. As this was the first time away from troops, one felt rather on one's own and that one's exploration of India had really commenced. It was also the first experience of the Indian restaurant car. The smell at breakfast time was emphatic and lingering. At tiffin time one was introduced in the pantry to an Indian murgai which was enjoying his last crow and at dinner time made his further acquaintance in the form of roast chicken. One thinks nothing of this after a time—by the way how many murgais does one consume in a five years' tour?—but on that first occasion it left an impression, a distinct impression, in more senses than one.

The beautiful rolling downs of Surrey appeared to have been transported wholesale to southern India and so one imagined—until in a clearing by the side of the line one saw a circle of thirty squatting monkeys holding a parish meeting with a chairman in the middle, an older and wiser monkey than the rest, but he was unable to call them to order when they jeered and made faces at the passing train. A score of parakeets of vivid plumage and more monkeys, this time performing physical jerks on the telegraph poles, and night fell. With morning, Poona and one's first station.

Settling into a bungalow is for the new-comer a strange experience. The afternoon siesta was abruptly terminated at 4 when the bearer acting under instructions produced furniture and tea. In the scanty clothing of a sultry day one was embarrassed to see a large procession enter the room, preceded by a tall and stately lady cooly carrying on her head articles of an intimate domestic nature, and followed by all her relations in single file completing the scale of hired furniture. To hide one's embarrassment attention was turned to tea. The bearer had procured a tea set, and what a set! With the coolies still dumping their articles on the floor in a scene of the utmost confusion the tea-pot caught the eye. It could not fail to do so. It was the sort which at home would have pursued a hurried journey from the drawing room to the dustbin. It was of cheap, gritty, white crockery, embellished with a semi-heraldic device of green ivy leaves, and in the centre in emphatic bold block lettering was the motto "GOD HELP YOU!" and below in smaller type "Made in Germany." Its one redeeming feature was that the motto was appropriate to the occasion.

And then the mentality of one's servants—what volumes could be written! The Poona bearer, a Mahratti, was no better and no worse than many. His chief tendency apart from a disinclination to see eye to eye with his master on matters of finance, was to cast blame whenever and wherever possible on someone else. One day noticing that clouds had suddenly obscured a previously clear sky, one asked with hand pointing heavenwards, thinking the monsoon might have started afresh, "What are all those clouds doing in the sky?" He went outside, looked at the garden, looked at the sky and returned with the remark, "It's the mali's fault, sir." Censure had been construed into an innocent question and so the gardener got blamed.

Soon after this the car arrived from home and one commenced one's exploration of India by road. One travels by train and one is amazed to find the entire population of India travelling by train and on the same day too! Then one travels by road and one is similarly amazed to find that the entire population has forsaken the railway and taken to the road. There is this difference however: when they go by road they take with them their ox and their ass, their sheep and their goat, their bile cart and their dog, and the last state is worse than the first. Another astounding thing one soon discovers and that is that the Indian dog does not get out of the way of the motor car. He just stays in front and gets killed. Goats hold the record for speed in escaping and rarely succumb; the slow record is held by dogs, with human beings a good second.

Punctures and punctures, what language has been used in India! The bullock drops his "half" shoe, ground to razor-like sharpness, the front wheel kicks it up and places it at the disposal of the rear wheel, whose tyre it enters with a loud report. An average of two punctures a week for six months resulted, solely caused by bullock shoes.

The Bombay-Poona run along the Duke of Wellington's great military

road is, apart from the steep climb of the Ghats, a fast one. The Iron Duke, however, did not foresee the era of mechanical transport and the climb up the Ghats, of 2,000 feet in four miles leaves much to be desired in the way of gradient and surface. Hairpin corners on a "one in five," with the inevitable bile cart concealed round the corner, involved pulling up on one's brakes with engine boiling and waiting in patience for such time as driver and bullock woke up and allowed one to pass.

The Caves of Karli just off this road are worth visiting as examples of primitive religious structure of the simplest and earliest type. You don't build, you just excavate at the side of a hill and so carve out your church. The nave is impressive and is said to resemble that of Norwich Cathedral.

Not far away are two picturesque lakes connected by a tunnel under the hills and the water from these lakes passing along a canal is dropped 2,000 feet below to the turbine station, whence the Tata Hydro Electric Company relay power to the city of Bombay.

A few days in Poona and orders were received to accompany a regiment by troop train to Dinapore and return with another regiment. The position of Dinapore on the map was unknown, but it did not matter, for further chances of seeing something of the country were welcome and one was prepared to go anywhere. Reference to the map, however, showed it to be alongside Patna, 1,200 miles away, and well over towards the other side of India.

In addition to the usual troop carriages was one specially reserved for families, and some of the latter overflowed into ordinary compartments. In one of these travelled a lady recently discharged from hospital, who it was stated should be under observation from time to time, for although the cold weather was approaching it was still well over 90° F. in the middle of the day. At the first stop a visit was paid to her carriage where she was found with the glass windows securely shut and the fans turned off, the worst possible arrangement for a hot day. Advised as to the dangers of heat when travelling in India, she politely but firmly declined to have either the windows open or the fans functioning—for fear of her hair becoming disarranged. And so she was left. A few hours later disgruntled workers by the wayside, disliking the presence of troops, hurled stones at the train and broke the only windows to be seen, those in this carriage, so the lady was compelled by force of circumstances to have fresh air whether she wanted it or not.

Further on, a long halt was made at a small station and we were invited to inspect the remains of an officer's car which, travelling in the baggage train ahead, had been almost completely burnt out. The cause was uncertain, but the owner's language was not, for the car was not insured.

The next day a diversion from the ordinary route through Jubbulpore had to be made, for the Nurbudda, rising in flood, had washed away the railway bridge which crosses it near this town. Accordingly the train was diverted from Itarsi via Bhopal and Jhansi to Allahabad. We crossed into

Bhopal over a great bridge and the river was even then almost in full flood, and going dead slow we saw only a few feet below the swirling water which had already exceeded by sixty feet or so its normal level. It is not the rush of rapid water which destroys the bridges in India, for the piers are shaped like the bow of a boat towards the current. It is the flotsam and jetsam, often houses, trees, etc., which, carried against the piers and driven at right angles to them, offer a broadside obstruction to the stream's destructive force. Apart from this the bridges usually stand until the flood reaches the railway line and then these immense structures are swept away, causing enormous expense, inconvenience and delay.

Bhopal is a fascinating country with its dense jungle and its multi-coloured scenes of foliage and plumage. The capital was reached at dusk and next morning we meandered slowly through the hilly country of Jhansi and frequently had to negotiate at dead slow speed lengthy bridges and viaducts of wood.

In the afternoon as we were running down an incline the communication cord was pulled and the train drew up. A soda-water bottle in the course of being opened had burst, an officer receiving a nasty wound of the wrist with considerable hæmorrhage. A second stop to apply sutures and dressing was required and the train got under way again.

As a wire was being drafted out to arrange for evacuation at Allahabad at night the cord was again pulled at a time when we were doing about 50 miles an hour down a long hill. What had happened? A man had fallen out. Nearly half a mile's walk back up the hill showed that this indeed was the case and the unfortunate man was lying between the two sets of metals with a fractured skull and on the point of death. Nothing could be done and he passed away before even a stretcher could be obtained from the train. Some doubt existed as to how the accident had occurred, but examination of a signal post showed clearly that this was the cause, and it was subsequently found that the man had been leaning out of the doorway of the troop carriage. Contact with the signal must have caused immediate unconsciousness. This unfortunate accident had a marked effect on the men and everyone was glad to complete the journey at Dinapore in the morning.

Through the kindness of the C.O. a car was made available for exploring the neighbourhood and advantage was taken of this to go to Patna along several miles of the banks of the Ganges. This great river was then in flood and its width in places about ten miles.

The heat and dust and filth of the Dinapore-Patna road revealed India at her worst. Crowded bazaars with swarms of unkempt children, pi dogs, flies and smells, again showed India a land of extremes.

The chief industry in this part is rice, and Patna rice is of course world famous. Low lying, dead flat land, irrigated from the Ganges and the paddy growing in water, such is the district for miles around.

There seemed little to do at Dinapore, at any rate in the heat of the day,

and the time was spent in the Club all through the long hot afternoon, waiting for the sun to go down and taking a perfunctory interest in the odd craft and wild-fowl on the adjacent river.

The outgoing regiment entrained in the cool of the evening and the night was spent in the train, a night of stuffiness, noises and mosquitoes, for we remained till daylight in the goods yard. Our way was resumed in morning and many inquiries were made regarding the journey down and the incidents which had occurred. Such things did not, of course, happen to a good regiment. No, perhaps they did not. . . .

During the course of the afternoon an officer received a wound of the thumb through the bursting of a soda-water bottle which he was opening. It was not as severe as the other accident, but was bad enough and orders were sent round at once for all bottles to be wrapped in a towel when being opened. The increased pressure caused by pushing in the stopper, combined with the heat and shaking on a long journey, is quite sufficient to make this an extremely dangerous proceeding. The metal-capped bottles are far preferable, for here pressure is reduced instead of increased on opening. Further, all kinds of dust and dirt are washed straight into one's drink, and yet we go on using these old-fashioned bottles, mixing our "chota pegs" with well-washed dirt.

However, to resume the journey. Well run regiments may not have things happen, but the next occurrence was the fall from the train of a follower's wife who received a mild concussion.

The climax of a series of adventures on this journey was reached on the morning of the last day. Information was received that twins had been born in the night! Amazement left one speechless! One was taken to the last coach and there on a perfectly good litter were the twins and their proud mother. The canteen goat had given birth to kids . . . and so ended an eight-day journey.

On return to Poona one settled down for a time and then inspection tours commenced. The first was to Ahmednagar and Aurangabad. One went by car. T.A. (travelling allowance) could only be claimed by rail as it is always cheaper. However, this tour proved an exception, for whereas the road is as straight as an arrow, the railway, via Dhond and Manhmand, proceeds in leisurely fashion round a great S-shaped figure and provides good T.A.

The station of Ahmednagar with its ancient fort, its schools of instruction and pleasant little Club is situated about seventy-five miles from Poona, and Aurangabad is about the same distance further on. Between the two places the wide Godaveri River has to be negotiated. There is no bridge and one just goes straight through. Soft sand and shingle for a quarter of a mile give place to a shallow stream deepening towards the far side. Here with running boards awash and about to rush the car out on to the steep bank, one found the way blocked by the inevitable blundering bile cart and a halt had to be called. The river bed held, but the engine

stopped. Fortunately the engine responded to the self-starter, the bile cart meandered out of the way and the car rushing the steep incline in bottom, landed safely on the other side. Prospecting for the return journey one saw that the engine would be in deep water at once and would be put out of action miles away from any assistance, so a mental note was made to inquire at Aurangabad for an alternate route homewards.

The Godaveri is the boundary in this part between British India and the northern extremity of Hyderabad and from here onwards the road was atrocious. Lunch by the wayside afforded opportunity to the bearer to give at a discreet distance a full and authentic description to a passing wayfarer as to who one was, where one had come from, where one was going,

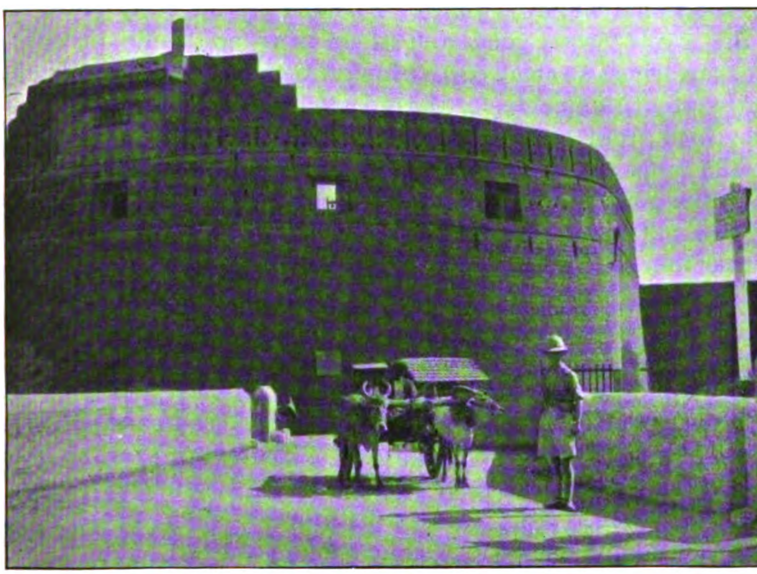

FIG. 2.—The Fort, Ahmednagar.

and the object of one's visit, for being catechized subsequently he gave affirmative replies to each question.

An English church steeple appearing above some small trees in the foreground seemed a strange sight in a land so far from home and somewhat out of place. Here, however, was Aurangabad, a former station of size and importance and now reduced to two Indian battalions and a miniature Club. Here is a fine mosque, the mausoleum of the Emperor Aurangzeb, a small scale replica of the Taj at Agra, and the custodian who was in charge was almost ready to lick the dust from one's boots on hearing that one had actually set foot in St. Sofia, the great mother church of his faith in Stamboul. An exquisite scene for a camera and many snaps were taken, but the spool was a dud and the results a blank.

Near Aurangabad are the celebrated caves of Ellora, perhaps the finest India has to show, and one was amazed to find numerous temples of the rarest design and carving excavated from the solid rock of the hillside. One contains a bas-relief of delicate design and in a frieze of gods and goddesses around the central stupa is seen one goddess with an inverted baby on her lap and her right hand raised in the attitude of chastisement. The ancients were certainly not devoid of humour.

Inquiry at Aurangabad showed that there was an alternate road by which the return journey to Ahmednagar could be made. There was a turning to the left from the Ellora Road which was quite easy to find and involved only a short detour. Quite simple on the rough map drawn to demonstrate it, but somehow it was not found and the short detour developed into an additional hundred miles. Fortunately an early start had been made, the roads were good and there was no traffic except outside Ahmednagar, where an army corps of pilgrims who had to be overtaken were apparently intent on suicide, for the repeated warnings of a loud hooter failed to rouse them from their lethargy.

The 185 miles to Ahmednagar was covered in seven hours and after a late lunch the journey was resumed to Poona without complication and a total of 255 miles was recorded.

Another tour, this time to Deolali and Bombay, was devoid of incident and on the second stage along the Nasik-Bombay Road a distance of just 100 miles was passed without seeing a single car, merely the wild desolate country of the Western Ghats and an occasional retiring sambhur.

If a dental officer ever plays golf at Deolali he must be somewhat put off his game, for a part of the Ghats in full view of the course exactly resembles the profile of a complete lower denture. This is, however, an interesting geological phenomenon, for it is one of the rare examples of the pulling apart of the earth's crust in contrast to the more usual contraction. However the dental officer is well handicapped.

The excellent road map of India which had been brought out from home proved somewhat inaccurate on this journey, for the thick red line of the Agra-Bombay Road went dead straight for the north of Salsette Island, but it is wrong. There is no means of crossing the wide estuary and a forty-mile detour had to be made to get back on the right road.

Driving in Bombay contains many snags. Continuing along the main road by which one enters the city, one ultimately finds oneself in a very narrow street full of carts, coolies and dogs and one is pulled up by a policeman. "Does the sahib know this is a one-way street and the sahib is going the wrong way?" Apologies, explanations and finally instructions to turn left into the Crawford Market enable one to emerge from an awkward predicament without loss of time or temper.

The last official tour was to Secunderabad, but duty first took one to Bombay, so the long railway run (497 miles) was commenced from the latter town. On this journey an excellent restaurant car provided a novelty

to the new-comer by way of cold roast peacock, a very palatable dish resembling turkey.

The name turkey, by the way, is interesting to those who have travelled in the East. In England we call it turkey because we think it comes from Turkey, quite simple. However, when one goes to Turkey and talks to a Turk he disclaims all knowledge of the name. No, he does not call it a turkey at all, he calls it a "hindee" because it comes from India. Here inquiry shows that the Indian makes no claim to the bird at all, he calls it something which sounds like "perrin," pronounced with a sort of French inflection, because it comes from Peru, and so one goes on chasing the wretched bird all round the world.

To return to India, the traveller has to change at Wadi Junction and proceed on the Nizam's State Railway to Hyderabad. At that time they ran the train into Hyderabad Station first and then reversed out to Secunderabad, which is within walking distance. This was the most tedious part of the journey for just as darkness fell the train ran into a bullock at about thirty miles an hour. A long delay occurred to ascertain: (1) whether all the wheels were still on the line; and (2) whether any dismembered portions of the animal were mixed up with the works. The inspection by the aid of two butties in the pitch darkness was somewhat protracted and we ultimately arrived very late.

Secunderabad and Bolarum are interesting and attractive stations situated in a wild boulder-strewn country, apparently of glacial origin, but the local inhabitants account for the boulders by saying that after the Almighty made the world these rocks were left over and He placed them here.

While waiting for the night train to leave Secunderabad for the return journey the bearer, engaged in argument with a local gentleman who apparently annoyed him, let out with his left and sent him spinning full length on the platform, scattering a small crowd. The latter became excited, blows were threatened and civil war between Hyderabad and the Mahrattis was only averted by the sudden departure of the train. Questioned as to his behaviour he replied that "the budmash had called him a bad name."

A three weeks camp followed by manœuvres left little time for monotony and the last tour from Poona was started. A round trip with troops to Madras, Wellington and back to Poona sent one wandering again over the south of India.

Madras is of exceptional interest. Four days of sightseeing by day and hospitality by night proved a pleasant diversion. There is an old world air about the capital of the Southern Presidency and many of the buildings go back to the remote period of our first settlement.

Fort St. George with the house in which Clive lived; St. Mary's Church containing his marriage register and many other items of historical interest; St. Thomé Cathedral where the names of the incumbents are

recorded through five centuries; St. Thomas's Mount where troops are stationed; Adyar and the Adyar Club, most distinguished of India's many Clubs; the beautiful residence and park of Mrs. Besant; the Madras Club whose khitmagars wear the narrow-pleated long skirt with high waist of their forbears, just as in the famous picture on the Club walls of the landing at Madras; all these are interesting sidelights on the past and present of a great British Settlement.

Perhaps the most unique of the show places of Madras is the Aquarium on the sea front, where numerous specimens of the marine life of the Bay of Bengal fascinate and amaze. The wonderful colour and shape of the fishes is unexampled. Neither the Naples Aquarium nor the one in the London Zoo contains anything to approach what one sees here for the diversity of colouring or form and one is left spellbound by the beauty of marine life in its many aspects.

Proceeding south from Madras the train traverses very different country from further north. Here are seen vast quantities of vegetation, coconuts, palms and eucalyptus and the people are of a much darker colour. At Podanur close to Coimbatore the train turns north again for Mettupalaiyam at the foot of the beautiful Nilgiri Hills. Here the broad gauge finishes and change is made into the narrow gauge of the hill railway.

A few miles of dead straight running through an areca-nut plantation and the ascent of the hills is commenced. The line is now worked on the ratchet system and a journey of great interest continues. Dense tropical jungle at the lower levels gives place to blue eucalyptus at the higher and one realizes how the hills got their name (Nilgiri, blue hills), for these trees so closely packed together do actually give the colour to the mountain side. Ravines and torrents, halting places and steep inclines bring one to Coonoor, the lowest of the hill stations. A short distance further on is Wellington, perhaps the pick of the military hill stations of India. The hospitality which one had received in Madras, in fact one might say throughout southern India, is continued here, and next day a taxi run of about fifteen miles to Ootacamund (8,500 feet) affords an opportunity of exploring the summer capital of the Presidency. Wide open spaces, rolling downs, a few distant peaks, occasional lakes and numerous villas are the chief features of an interesting landscape, which at this height and temperature is of a very English appearance.

The return trip from Wellington to Poona was uneventful save for the fact that on the main line beyond Arkonam Junction the train came in two. A coupling broke and some time was lost in repairing it, but fortunately no serious damage was done. After four days, Poona again, night time and the fireflies in thousands as the train leisurely steamed into the station.

Within a few days another move was contemplated and this time a permanent one, for orders came through to proceed to Burma. The bearer, confident of a soft job for a couple of years, was stirred to the depths of

emotion and left in a flood of tears. Poor beggar, it was rotten luck just at the end of the trooping season, too, and no job in sight. So the next morning he was informed that he could come to Burma and continue in his job, provided that he would stay two years. He left salaaming and by evening produced a bazaar letter-writer's effusion informing his master that while he would always continue to pray for his long life and prosperity, he would require to come to Rangoon two thick blankets and 80 rupees a month. The idea of thick blankets in Rangoon was ludicrous and the 80 rupees his undoing.

He came as far as the boat at Madras and there, having delivered the kit intact into the cabin of the ship, received his pay and some baksheesh and departed in peace.

The journey down (675 miles) had been uneventful but hot, 110° F. having been reached each afternoon. Madras again was sticky and one was glad to embark. The boat goes out with the punctual timing of a train every Friday morning at 10 o'clock and as the low horizon of a palm-fringed coast receded into the haze of a tropic day farewell was said to southern India and to 12,000 miles of journeys by rail and road.

(*To be continued.*)

Current Literature.

UGLOW, W. A., MILLER, A. A., & KAR-KADINOWSKY, T. A. Reinigung des Trinkwassers mit Filtern aus versilbertem Sand. **[Purification of Drinking Water by Means of Filters made of Silver-coated Sand.]** *Milit.-Med. Ztschr.* Moscow. 1931, v, 2, No. 1, 5-11, 1 fig. [In Russian.]

River or sea sand is used. The sand-grains should be of 0·3 to 1·0 mm. in diameter. The sand is thoroughly washed, dried, calcined in open pans for about two hours, and, while still hot, treated with a solution of silver hydroxide $Ag(OH)_2$. This is prepared from a 2 per cent solution of silver nitrate ($AgNO_3$) to which a 10 per cent. solution of spirit of ammonia is added gradually until the solution becomes quite clear. The solution is heated to 50° C. and poured over the sand, two parts of solution being added to one part of sand. The vessel containing the sand and solution is placed in hot water and for every two grammes of silver nitrate is added 1·1 c.c. of a 20 per cent solution of formaldehyde. The sand is rapidly stirred until it becomes silvery or light grey. A dark grey coloration of the sand is not so good, but such sand is still useful. The sand is allowed to settle for fifteen seconds and the solution is then poured off. Fresh water is poured over the sand and allowed to stay for fifteen seconds. It is then poured off

and the procedure is repeated until the water poured off is quite clear. The sand is then washed in running water for an hour and is ready for use.

Experiments have proved that the filter acts not only mechanically, but that the silver has a decided bactericidal effect and in one experiment 99·8 per cent of the *Bact. coli* in the water were thus destroyed in the filter.

A. ORLEY.

Reprinted from "Bulletin of Hygiene," Vol. 6, *No.* 11.

BOLDYREW, T. E. Ueber die Möglichkeit der Anwendung von Chlorpikrin für die Desinsektion der Kleidung in der Kriegszeit. **[The Use of Chloropicrin for the Disinsection of Garments in War Time.** *Milit.-Med. Ztschr.* Moscow. 1931, v, 2, No. 1, 43-52. [11 refs.] [In Russian.]

Entirely reliable positive results have been obtained with chloropicrin in both stationary and mobile disinsection chambers by using a concentration of chloropicrin of not less than 30 c.c. for every cubic metre of the chamber at a temperature of not less than 25° C. The powerful disinsectant properties of chloropicrin and the ease of its application make it very valuable for dealing with garments in war time. Chloropicrin can be used in any disinsection chamber which can be hermetically sealed.

A. ORLEY.

Reprinted from "Bulletin of Hygiene," Vol. 6, *No.* 11.

[Presumably "disinfestation" is meant by the word "Desinsektion." *See* Dorland's "Illustrated Medical Dictionary."]

SCHWARTZ, A. T. **Report of a Mild Epidemic of "Food Poisoning" by Ice at the Naval Air Station, Anacostia, D.C., and the Marine Barracks, Washington, D.C.** *United States Naval Medical Bulletin.* 1932, xxx, 141.

A mild epidemic of food poisoning broke out simultaneously at the Naval Air Station, Anacostia, and at the Marine Barracks, Washington.

At the marine barracks cases began to come in on May 12, and continued coming in until the 15th, there being in all fifteen enlisted men and three wives of officers. At the naval air station there were fifty cases from May 13 to 14.

The symptoms of the patients were diarrhœa, nausea, some vomiting and varying degrees of abdominal pain.

The cases all recovered in a day or two.

Milk, tap water and melted ice were examined. The milk gave a bacterial count of 35,000 per cubic centimetre (nature of organism not stated). The tap water was "bacteriologically negative," and the "colon bacillus" was found in the ice.

The writer states that all other articles of food were eliminated, and he suspected the ice as being the cause of the outbreak since it was the only food material used by all the individuals affected.

It was then found that the ice was supplied to both stations from an ice plant at the Washington Navy Yard. Investigations showed that a negro employed in the ice factory had suffered from diarrhœa from May 5 to 8, but carried on his work during this time. He stated that many people in the neighbourhood where he lived were ill with the same symptoms. There was no history of recent illness among the other employees at the ice factory. Other units were supplied with ice from the Navy Yard, but there were no cases of illness among them.

It was found that three days before the beginning of the outbreak the wooden covers of the freezing bath were washed with boiler compound, which contains two per cent tannic acid. This compound was used to whiten the wood. The boiler compound was used greatly diluted and the writer does not consider it as a likely cause of the illness.

In the ice factory it takes forty-eight hours for complete freezing to take place.

It is considered that water contaminated on May 5 was delivered as ice on the 8th or 9th and consumed on the 9th, 10th and 11th.

Bacteriological examinations of stools were not made.

LANE, CLAYTON. **Housing and Malaria: (A Critical Summary of the Literature dealing with this subject).** *Series of League of Health Publications*, III, Health. 1931, iii, 6.

For this work Lieutenant-Colonel Clayton Lane has made a very complete survey of the available literature and has divided the work into the following nine sections:—

(1) The anopheles associated with malaria.
(2) Malaria houses and anopheles houses.
(3) Arrangement of the house and the habits of those who dwell in it.
(4) The habits of anopheles in relation to malaria infection.
(5) A hospice-return instinct.
(6) A stay-at-hospice habit.
(7) The blood meals of anopheles.
(8) Influence of animals and animal houses.
(9) Effect of preventive measures.

The writer then sums up, and among his conclusions are the following:—

The anopheles associated in the transmission of malaria are mainly house-hunters and night-biters.

Certain species of anopheles leave the house, where they have fed, immediately after feeding; others remain in it for some hours.

In Europe, Northern America and Brazil it has been found that mosquitoes which have ceased ovipositing may remain in the house where they have fed and are capable of transmitting malaria.

Anopheles caught in houses have been found containing blood derived from some animal outside the house.

There is not sufficient evidence to show that malaria-carrying mosquitoes prefer the blood of animals to that of man, or that airless animal houses near human habitations protect man from the bites of anopheles.

During the construction of the Panama Canal, Surgeon-General Gorgas and others working there held that the destruction of replete anopheles in houses was a most effective anti-malaria measure.

The value of screening houses was proved by Manson's experiments many years ago.

It is chiefly in houses that malarial infection is obtained. The relationship of house sites to anopheles breeding places, the manner in which malarial infection can be fostered or hindered by housing men near to or far from such breeding places is evidence in the same direction.

The various lines of investigation point to the conclusion that the house is a factor of primary importance in the acquisition and spread of malaria.

There is an extensive bibliography.

Reviews.

PRACTICAL MORBID HISTOLOGY. By Robert Donaldson, M.A., M.D., with a Foreword by Sir Humphry Rolleston, Bt. Second edition. London: William Heinemann (Medical Books), Ltd. 1931. Pp. ix + 487 and 214 illustrations. Price 42s. net.

This new edition has been completely revised and much new material has been added. The format has been considerably improved and the book has now fallen into line with the majority of the textbooks on this subject. Professor Donaldson's volume does not replace any of these, but occupies the position between the big textbook and the small laboratory manual. The inclusion of more than 200 illustrations by the late Richard Muir will make the new edition attractive to students. Although many of the drawings are extremely good and, from an artistic point of view, well done, it is the reviewer's opinion that simple line drawings and diagrammatic illustrations are of greater help to the student in understanding a pathological process. If the illustrations are too good students may spend too short a time with their slides.

The arrangement of the book is on the lines of the older orthodox writers, where the diseases of organs are dealt with rather than pathological processes, and is the usual method of teaching pathology in the class room. The description of naked-eye and microscopical appearances of the organs in various diseases is generally clear and practical. It is doubtful, however, if the very full description (for a book of this size) of the diseases of the kidney is clear enough to enable the student to follow the histological changes in nephritis with any great understanding and benefit.

Towards the end of the book the author has a very useful section on histological methods. It would have been more useful if in the section for the demonstration of bacteria in tissue the author had included a satisfactory method for the demonstration of Gram-negative bacteria. The value of a Leishman-stained section taken in conjunction with a Gram-stained section in showing up these organisms is so obvious, yet it appears to be but little appreciated.

At the end, in an appendix, the characters of various worm parasites and their ova, together with brief life histories, are set out in a series of tables. If the medical student is expected to have such a knowledge of medical helminthology as is represented by these tables, it is suggested that the information might have been presented in a more easily assimilable manner.

PHYLAXIS. By the late G. Billard, M.D. Anglo-French Library of Medical and Biological Science. London: Kegan Paul, Trench, Trübner and Co., Ltd. Pp. xii + 77. Price 9s. net.

This somewhat expensive little book is an exposition by an eminent French physiologist of a means of protecting nerve cells against certain neurotoxins. The author maintains that this protection must not be confused with ordinary passive immunization which is essentially a neutralization. Phylaxis is a process in which toxins are prevented from entering nerve cells and are kept at bay until they are finally removed by the circulation. In other words, he has found that he can saturate nerve cells by injecting non-lethal doses of such substances as sparteine, chloroform, gardenal (luminal), and certain mineral waters, so that they are unable to take up such neurotoxins as those of rabies virus, viper's venom, diphtheria and tetanus. The greater part of the book is taken up with a description of animal experiments that demonstrate these phenomena. These results are of extraordinary interest and do offer explanations of certain curious phenomena that have been observed in relation to some of the neurotoxins. At the present moment it would not appear that phylaxis, as a practical proposition, has anything of definite value to offer us, but the conception is an extremely attractive one, and it may be that protective or even therapeutic agents may be evolved as the result of further investigations on these lines.

THE ELEMENTS OF IMPERIAL DEFENCE. By A. G. Boycott, B.A. Aldershot: Messrs. Gale and Polden, Ltd. 1931. Pp. xv + 402. Price 12s. 6d.

The author has compressed into a handy volume of twenty chapters an enormous amount of information about our Empire. The first four chapters deal with the subject as a whole and describe the growth, the political organization, the organization for defence and the material

resources which are actually available. A chapter is then given to each of the ten big areas into which our Empire is divided—one for Great Britain, one for Canada and Newfoundland, one for Australia, and so on—and in a thoroughly systematic way everything is described under various heads in the same order throughout, which makes the book easy of reference. The all-important subject of communications fills the next five chapters, and a final chapter describes the Empire's Defence Services. The book contains a large number of excellent maps and there is a useful bibliography at the end of each chapter.

This book is of very special interest to-day and deserves careful study.

A. C. H. G.

MALARIA CONTROL BY ANTI-MOSQUITO MEASURES. By Major Gordon Covell, I.M.S. Calcutta: Thacker, Spink and Co., Ltd. Pp. ix + 148. Price 7s. 6d.

This is an up-to-date summary of modern anti-malaria methods and it should be of use to medical officers doing duty in India. It is well arranged and on the whole concise; it could be made still more concise by omitting reference to the bewildering number of traps, fumigants and oils which have been tried, and by referring only to a few of those which are of proved value. The bibliography is very complete and occupies nearly one-third of the book.

Correspondence.

PARADE OF THE SOUTH AFRICAN VETERANS AND THE RETURNED SOLDIERS' ASSOCIATION IN CHRISTCHURCH, NEW ZEALAND.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—I read with interest the note from my old friend, Colonel Clark, whom, by the way, I have not seen since the Honingspruit in 1907. On June 1, 1931, I commanded the parade of the South African Veterans and the Returned Soldiers' Association in Christchurch. The Returned Soldiers parade as Infantry and the South African Veterans as dismounted Cavalry. Although I have not been in dismounted Cavalry since the Riding School in 1904, I managed to pull through without any mishap except that of dismounting a cyclist who cut across the column between the O.C. and the band.

I trust that when the exchange becomes more favourable towards Australia I will have the privilege of seeing Colonel Clark in New Zealand.

Should any other officers of the Corps be visiting New Zealand I would remind them that my present duties involve supervision of water supplies, including trout streams.

Department of Health,
District Health Office,
Christchurch, N.Z.
November 25, 1931.

I am, etc.,
F. W. W. DAWSON,
Lieut.-Colonel.

OBITUARY OF THE LATE MAJOR-GENERAL SIR DAVID BRUCE.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—May I be permitted to correct two inaccuracies in the obituary of the late Major-General Sir David Bruce, published in the January issue of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, vol. lviii, No. 1, p. 2, 1932?

It was in 1895, not 1898, as stated by you, that Bruce was sent to Zululand to investigate "nagana," and his "Preliminary Report" ("Preliminary Report on the Tsetse-Fly Disease, or Nagana, in Zululand." Durban: Bennett and Davis) was actually published in the former year. In the covering letter forming a preface to his "Further Report" ("Further Report on the Tsetse-Fly Disease, or Nagana, in Zululand." By Surgeon-Major David Bruce, A.M.S., Ubombo, Zululand, May 29, 1896. London: Harrison and Sons, February 4, 1897), Bruce writes that he "left Pietermaritzburg on August 21, 1895, and arrived at Ubombo, Zululand, on September 8, 1895, for the purpose of investigating the Tsetse-Fly Disease, or Nagana, as it occurs in Zululand."

Secondly, the tsetse-fly studied by Bruce during his classical and epoch-making investigation in South Africa was *Glossina pallidipes* and not *Glossina morsitans*, in whose area of distribution, so far as I am aware, Zululand is not included.

British Museum (Natural History),
Cromwell Road, London, S.W.7.
January 29, 1932.

I am, etc.,
E. E. AUSTEN, *Major,*
Keeper of Entomology.

ANDREW BALFOUR MEMORIAL.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—It has been decided to found a memorial to Sir Andrew Balfour, K.C.M.G., C.B., LL.D., M.D., F.R.C.P., who it will be remembered died in January, 1931, shortly after the opening of the London School of Hygiene and Tropical Medicine, of which he was the first Director.

When funds are available it is intended to place a simple and inexpensive monument in the School, and with the remainder of the sum received

to establish an Andrew Balfour Memorial Fund for helping students, preferably from overseas, to pursue courses of study at the School.

We feel that Balfour's many friends all over the world would not wish to miss the opportunity of contributing to such a memorial, and we should therefore be grateful if you would kindly allow this letter to appear in your columns.

We are confident that even considerations of hard times, heavy taxation or other depressing circumstances will not deter those friends from helping to build up a fund of worthy proportions as a permanent memorial to a magnificent career.

While it is hoped that all who can do so will send a donation in the near future, it is not proposed to limit the period during which the fund will remain open, and promises of donations or bequests will be gratefully acknowledged.

Contributions should be sent to the Honorary Treasurer, Andrew Balfour Memorial Fund, London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.

Yours faithfully,

(Signed) James Crichton-Browne
James Currie
M. H. G. Fell
W. H. N. Goschen
D. Lyall Grant
W. W. Jameson
P. S. Lelean
Lloyd
Montagu Norman
W. Ormsby-Gore
A. T. Stanton
Henry S. Wellcome
C. M. Wenyon
Reginald Wingate.

London School of Hygiene and Tropical Medicine,
Keppel Street (*Gower Street*), *W.C.*1.
January, 1932.

Notices.

ROYAL ARMY MEDICAL COLLEGE LIBRARY.

LIST OF BOOKS RECEIVED DURING THE PERIOD OCTOBER 1 TO DECEMBER 31, 1931.

Author(s)	Title of Work	Grant or Gift
Morley	Abdominal Pain	Grant
Thomson & Miles (Wilkie)	Manual of Surgery. Vols. I, II, III	,,
Prescot & Winslow ..	Water Bacteriology	,,
Orla Jensen	Dairy Bacteriology	,,
Bundy (Weeder).. ..	Textbook of Anatomy and Physiology ..	,,
Mitchell	Recent Advances in Analytical Chemistry. Vol. II	,,
Piney	Recent Advances in Microscopy	,,
Beaumont & Dodds ..	Recent Advances in Medicine	,,
League of Nations ..	Report of the Malaria Commission on its Study Tour in India	,,
Sach	Diagnosis of Brain Tumours with Treatment	,,
Brown	Mind and Personality	,,
Thomson & Riddoch ..	Diseases of the Nervous System	,,
Covell	Malarial Control	,,
Plazek	The Sexual Life of Man..	,,
Robertson	An Introduction to Hygiene	,,
Fifield (Love)	Minor Surgery	,,
London School of Tropical Medicine & Hygiene	Collected Addresses 1931-32	Authors
Topley & Wilson ..	Principles of Bacteriology and Immunity ..	Grant
Donaldson	Practical Morbid Histology	,,
White	Heart Disease	,,
Browning..	The Vitamins (Monograph of Pickett-Thomson Laboratory)	,,
Pauchet & Dupret ..	Pocket Atlas of Anatomy	,,
Kolmer & Boerner ..	Laboratory Technique	,,
Gardner	Microbes and Ultramicrobes	,,
Osgood & Haskins ..	Laboratory Diagnosis	,,
Blacklock & Southwell ..	Human Parasitology	,,
U.S.A. Public Health Dept.	Report on Communicable Disease Control ..	,,
Armstrong	The Glycosides	,,
Page & Adams	The Principles of Electricity	,,
Hutchinson	An Index of Treatment	,,
Smith & Feilding ..	Modern Medical Treatment	,,
Lucas	Forensic Chemistry and Criminal Investigation	,,
Bailey	Emergency Surgery. Vol. II	,,
Bainbridge & Menzies (Hartridge)	Essentials of Physiology	,,

THE DISPOSAL OF ANIMAL LITTER IN THE FIELD.

MAJOR T. O. THOMPSON informs us that in his article in the January number of the Journal he gave the initials of Private Richardson as "H. A. F." They should be "H. J."

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a nom-de-plume.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

A free issue of twenty-five reprints will be made to contributors of Original Communications and of twenty-five excerpts in the case of Lectures, Travels, Clinical and other Notes, and Echoes of the Past.

Reprints or excerpts, additional to the above, can be furnished on payment if specially ordered at the time of submission of the article for publication.

Communications in regard to editorial business should be addressed—"The Editor, Journal of the Royal Army Medical Corps, War Office, Whitehall, London, S.W. 1."

MANAGER'S NOTICES.

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Cheques, etc., should be made payable to the "Journal R.A.M.C.," and crossed "Holt & Co."

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Communications in regard to subscriptions, change of address, etc., should be addressed "The Manager, Journal of the Royal Army Medical Corps, A.M.D.2, War Office, Whitehall, London, S.W. 1."

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Communications regarding Advertisements should be addressed—

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Journal

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IN ARDUIS FIDELIS

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LIEUTENANT-COLONEL A. DAWSON, R.A.M.C.

MANAGER.
MAJOR S. W. KYLE, R.A.M.C.

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Journal
of the
Royal Army Medical Corps.

Original Communications.

THE INTERNATIONAL STANDARDIZATION OF FIELD MEDICAL EQUIPMENT.

By MAJOR-GENERAL D. J. COLLINS, C.B., C.M.G.

THE permanent international standardization committee, which was set up in conformity with a resolution of the Twelfth International Red Cross Conference, held in Geneva in 1925, is under the auspices of the Comité International de la Croix Rouge (C.I.C.R.).

It is composed of :—

(1) A variable number of delegates nominated by
- (*a*) the Ministries of War of the nations that have signed and ratified the Geneva Conventions.
- (*b*) certain national Red Cross Societies, who have been invited to send delegates. As a rule only one representative from each country attends.

Last year the following countries sent representatives: Belgium, France, Germany, Great Britain, Holland, Italy, Poland, Roumania, Switzerland, Spain, Sweden and Japan.

(2) A representative of the International Red Cross Committee.

(3) The secretary-general of the International Congress of Military Medicine and Pharmacy.

The clerical staff is supplied by the International Red Cross Committee.

Technical experts in different subjects are co-opted as members when required.

The president of the committee is selected in turn from one of the

nations represented. With this object in view, at each annual meeting a vice-president is elected, who automatically becomes president in the following year.

The aims of the committee are:—

(1) To investigate the requirements of the medical services of military, naval and air forces, with a view to arriving at a conclusion as to the best types of equipment to recommend for the approval of the Governments interested.

(2) To examine and test the different models of apparatus and equipment submitted to the competitions organized from time to time by the International Red Cross Committee, and to award the prizes therefor.

The committee meet annually during the week commencing with the second Monday of October at the Institute for the Study of Field Medical Equipment, Rue du Pâquis, Geneva.

They place on the agenda for the following year certain subjects, for which "Reporters" are selected from among the different nations repesented at the committee.

Notification regarding the selected subjects is sent by the C.I.C.R. to the various countries and to national Red Cross Societies, who are asked to send to the Reporter specimens of all appropriate models, as well as any plans, photographs and documents which may be of service.

The investigation of the subjects on the agenda may be completed the following year, or it may extend over two or more years.

When the subject under discussion is of a simple nature and its discussion is of such a character as to raise no difficulties, the debate is terminated by a series of resolutions, the text of which is notified by the C.I.C.R., through diplomatic channels, to the different Governments and national Red Cross Societies.

If, on the other hand, the subject is one which needs a deeper investigation, the following is the procedure:—

The first year is devoted to assembling all available models, specifications, drawings and publications bearing on the subject. After examination of the documents and experiment with the models, the Reporter presents his investigations and conclusions in a report submitted to the C.I.C.R. The printed report is sent by the latter body to each member of the Standardization Committee, so that it may be fully studied before the commencement of the next meeting, when it is discussed, the experiments repeated, or others suggested, as may be deemed necessary.

The Committee embody their views in resolutions, as before, except that the resolutions are provisional, and are submitted by the C.I.C.R. to the Governments, etc., for their consideration and criticisms.

After an examination by the Reporter of the criticisms from Governments received by the C.I.C.R., the draft of the resolutions is confirmed at the next annual meeting of the Committee.

When the discussion of a difficult or complex question demands it, or

when the Committee do not consider themselves sufficiently informed, the matter may be retained on the agenda for successive years, until a final decision is arrived at.

The resolutions adopted by the Standardization Committee are submitted to the International Red Cross Conference (composed of representatives of all the nations), and only become definitive when they have received the approval of this body.

The expenses connected with the holding of the annual meetings, the experiments, competitions, etc., are borne partly by the C.I.C.R. and partly defrayed by contributions from the Governments who send delegates to the Standardization Committee. The Institute, a large and well-equipped building, contains specimens of the army medical field equipment of the Powers who have signed the Geneva Convention, all of whom (with very few exceptions) make a small annual contribution to the upkeep of the Institute.

The records of the Standardization Committee belong to the C.I.C.R., and form a section of the International Institute at Geneva. They may be consulted only with the permission of the C.I.C.R.

The President directs the proceedings of the Standardization Committee. Each member in turn is invited to give his opinion, and at the end of each discussion the President sums up before proceeding to a vote.

All the discussions, etc., take place in the French language, but if a delegate wishes he may bring an interpreter with him. In voting, each nation has only one vote, even though that country may be represented by a Red Cross delegate as well as by a representative of the Government. In the case of divergence of opinion between two delegates from the same country, the opinion of the Government delegate only is accepted.

The secretary-general of the International Congress of Military Medicine and Pharmacy attends in a consultative capacity, and has not the right of voting.

Competitions.—The Twelfth International Red Cross Conference (1925) decided to adopt a system of competitions regarding certain articles of equipment to be standardized, with a view to arriving at the adoption of ideal patterns.

The competitions are announced a year or two beforehand through the agency of the C.I.C.R. The Standardization Committee decide the details of these competitions and indicate precisely the points which will be taken into consideration in the final judgment.

The tests are carried out before a plenary session of the Committee, unless they are of such a character as to extend over a long period of time, in which case they are handed over to a sub-committee of technical experts, who make their experiments before, and present their conclusions at, the annual general meeting of the Committee.

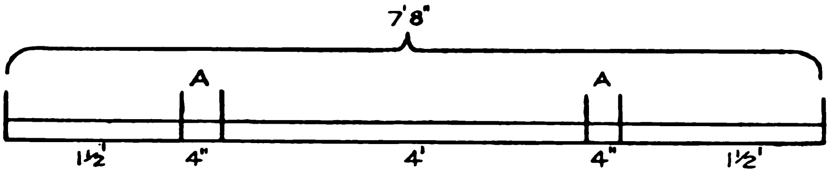
The awards are made by the C.I.C.R., and may consist either of medals or money, and each reward is accompanied by a diploma.

The work accomplished so far by the Standardization Committee includes :—

I. *Field Stretcher.*—The committee have standardized the following measurements :—

(*a*) Length—		
Pole	.. .. ..	230 cm. (7 ft. 8 in.)
Canvas	.. ..	optional
(*b*) Width, total	.. ..	59 cm. (23½ in.)
Height	.. .. ..	40 cm. (16 in.)
Weight	.. .. ..	12 kg. (26·4 lb.)

These are maximum measurements. They may be less, but should not be exceeded. Four spaces of at least ten centimetres (four inches) should be left at the sides of the canvas to receive the apparatus for the support or suspension of the stretcher (A.A.).



While leaving the *design* of the stretcher optional to each nation, the Standardization Committee recommends that, when present stocks are exhausted, the existing pattern of stretcher should be replaced by one fulfilling the following conditions :—

(1) Divisibility into two identical halves.

(2) A central joint in the poles, made of identical and interchangeable parts, forming a stretcher, simple, rigid and easily fixed, even in the dark.

(3) Detachability of each half of the canvas.

(4) Strength and simplicity (no pins, chains or other detachable parts).

(5) Possibility of each half being used as a trench stretcher.

(6) Each complete half should be capable of being carried over a bearer's shoulder.

II. *Stretcher Slings.*—These should consist of two pairs of slings, composed of resistant, inelastic material, not more than three inches wide, crossing each other slot-wise between the centre of the bearer's shoulders behind, and leaving the chest free.

At one extremity of each sling is a double metal buckle, which allows the length to be altered to suit the bearer's stature.

III. *The First Field Dressing*, applied as a temporary dressing, either by the wounded man himself or by one of his comrades.

(1) The packet should have a smooth, even surface.

(2) It should be enclosed in two coverings, of which the inner one (at least) should be of some absolutely impermeable material.

(3) The outer covering should have printed on it (*a*) a Red Cross or similar equivalent emblem, such as the Red Crescent (Turkey) or the Red

Lion and Sun (Persia); (*b*) the words "first field dressing" (*pansement individuel*) in the national language; (*c*) a mark or a sign indicating the method of opening the packet; (*d*) directions for application—these should be on the inner envelope also.

The standardized stretcher. Showing half a stretcher carried *en banderole*.

(4) The dressing should be so folded that it is readily undone and easy to apply.

(5) The minimum contents of the packet should be one bandage, and one compress fixed to, and moveable along, the bandage.

Measurements.—(*a*) Minimum area of each compress, 5·2 by 5·6 inches, (*b*) bandage, 16 to 20 yards long, and 2·4 to 2·8 inches wide.

The compress should consist of gauze and wool, in the proportion of $\frac{3}{5}$ wool and $\frac{2}{5}$ gauze.

(6) The portion of the compress to be taken hold of (if necessary) as well as the end of the bandage should be clearly marked by a coloured thread or similar design.

(7) The contents of the packet should be permanently sterile, and the compress impregnated with an antiseptic, which should

The standardized stretcher slings.

(*a*) be chemically stable,
(*b*) last for an indefinite period,
(*c*) be capable of being sterilized at 110° to 115° C. without decomposition,
(*d*) be of moderate price,
(*e*) be effective not only against ordinary pyogenic, but also against anaerobic organisms, and should produce no injurious effects on healthy tissue,
(*f*) be slow in action, but prolonged.

(8) The packet should be carried in an inside pocket of the tunic, on the left side.

IV. *The Identity Disc.*—The identity disc (*plaque d'identité*) should be made of a non-inflammable substance, resistant to the products of cadaveric decomposition; about 2 mm. thick; of oval form (50 mm. by 40 mm.), divided on its shorter axis into two equal parts, separated by a linear depression, to enable the disc to be readily broken in two if necessary. The half to be suspended from the neck has two holes at the upper pole, while the lower half has only one.

The identity disc should be hung round the neck by a cord composed of fine wire covered with a brown plaited material.

The inscription should be engraved or impressed in capital letters, should be identical on both halves, and should include, on the front, such *personal* details as

(*a*) surname,
(*b*) first Christian name and initials of other Christian names,
(*c*) religion;

and on the back, *military* particulars, as:

(*a*) number,
(*b*) unit,
(*c*) place of enlistment, etc.

In accordance with Article 4 of the Geneva Convention of 1906, and Article 14 of the Hague Agreement of 1907, the detachable portion of the identity disc found on a dead enemy must be transmitted to the Bureau referred to in these Articles. This dispatch may be made either direct, or through the mediation of the C.I.C.R.

Space will not permit of going into further detail regarding the activities of the Standardization Committee, but the following may be mentioned among the investigations pursued during the past five years:—

V. Field Medical Card.
VI. Field Hospital Records.
VII. Envelope for Medical Documents.
VIII. Detailed Nomenclature of Wounds.
IX. The Cacolet Litter.
X. Identity Cards.
XI. Adaptation of the Standardized Stretcher
(*a*) to wheeled apparatus.
(*b*) to aircraft.
(*c*) to skis and sledges.
(*d*) as an operating table.
(*e*) as a bed.
XII. Ambulance Transport
(*a*) motor.
(*b*) horse-drawn.

It will thus be seen that the Standardization Committee has already made considerable progress towards the solution of the problems set it by the International Conference of 1925.

MALARIA IN INDIA.

By Lieutenant-Colonel J. E. M. BOYD, M.C., F.E.S.,
Royal Army Medical Corps.

Part II.—Anti-malaria Work and a few Suggestions.

(Continued from p. 194.)

The final section is now reached, namely :—

(c) *The Protection of the Healthy Man.*

The most obvious procedure in this case is to remove him entirely out of reach of all possible vectors by sending him to some hill station, and keeping him there until all danger of infection is over. This "cold storage" system is now in vogue : Troops are sent to the hills during the hot weather, usually in two parties ; the first arrives about the middle of April and leaves in the middle of July, the second party then moves up to the hills, returning in October. Women and children move up in April and return in October. It is with the second party of troops and the women and children that we are concerned.

The highest incidence of malaria at Ferozepore is in November. Under existing conditions, with electric fans and a plentiful supply of ice, it should be possible to keep the families in the plains until the middle of May, especially if they can complete their train journey by night; they should then remain in the hills until the end of November. As far as possible the men should be kept in the hills until the end of November, but here the protests of the various district, brigade and regimental commanders can be imagined ; they will ask, "How can I complete my training if the men are kept in the hills?" A very reasonable question, but the "opposition" may ask, "Which is the better for your training, a healthy unit in December or a malarious unit in November?" If all the elementary stages of the men's training could be carried out in the hills, there should be ample time to complete intensive training in the plains between the beginning of December and the end of April. This would be one of the problems to be solved by the suggested central committee.

(Appendix VIII gives the incidence of cases of malaria at Ferozepore during the years 1926-30.)

The second most satisfactory method of protecting the uninfected men *en masse* is by mosquito-proofing their barracks. If this is properly done few, if any, mosquitoes should find their way into the buildings. The proofing of the old type of barracks, such as one finds in the Punjab, is both difficult and expensive; still it has been carried out at Lahore Cantonment with excellent results, and there is no reason why similar

results may not be anticipated at Ferozepore when funds for the purpose are provided.

The type of building which is needed in the plains is one in which the rooms are well ventilated and lighted, but the direct rays of the sun, hot winds and dust storms must be excluded; inner doors are therefore essential.

In cases of emergency there must be facilities for rapid egress and the method of proofing must be both efficient and fool-proof. Where fly-proof or mosquito-proof doors are provided, it is a common practice to place stones or small pieces of wood in the hinges to keep the doors open; when anyone in authority is seen approaching efforts are made to close the doors, the result being sprung hinges. Therefore something more efficient than gauze-covered doors is needed.

All bungalows and barrack blocks in the plains have verandahs with openings for light and ventilation, and if these verandahs are made mosquito-proof it will be possible to close the inner doors during the heat of the day and at night should a dust storm arise. One double door at each end of the verandah should prove sufficient for the use of men entering or leaving the building. Windows, in addition to being covered with gauze, should also have a wooden or metal shutter. Chimneys and ventilators must also be made mosquito-proof.

Let us now consider what materials should be used for screening. Wire netting of such a mesh as to prevent all species of mosquito from entering must be used, but this mesh must be of the largest that can be used, otherwise air will also be excluded. A mesh of sixteen to the linear inch will keep out anophelines, and will prove sufficient as far as malaria is concerned; but to exclude the smaller species, such as *Aëdes calopus*, a mesh of eighteen to the linear inch will be found necessary.

Netting is obtainable of the above-sized meshes made of: (1) japanned iron which is painted while clean and hot; (2) galvanized iron; (3) bronze; (4) copper. The two last will stand the weather conditions better than the two first mentioned, but are more expensive; copper netting is, however, very soft and liable to stretch, even a moderate push being sufficient to open the meshes.

As regards the fitting of the netting on to the verandahs, this should be of a permanent nature but so fixed that in emergencies, such as fire, earthquake or an alarm of any kind, it can be easily pushed outwards. All windows should have permanent netting. Doors should have the netting fixed on to stout frames; these must fit tightly and be made of some material unlikely to warp.

Doors must open outwards, otherwise mosquitoes which have settled on them will enter the house when the doors are opened. Where there is any choice the door of the main entrance should face in the direction of the wind which prevails in the evening, as the mosquitoes congregate on the lee side of a building. Edge fitting doors are useless, if made of wood, since

during wet weather the doors will fit too tightly or will leave a gap at the edges when the weather is dry. The doors must shut against a broad surface (a batten at the top, bottom and both sides) so that, no matter whether the door shrinks or not, it will shut flat and tight, provided of course that it does not warp.

In addition to a broad board for a brace about the level of one's hand when opening the door, there should be, in addition, strips of wood about one or two inches wide, on the inner side of the door to protect the wire screening from the push of the hands, knees or feet of anyone trying to open it from the inside. Doors should be fitted with springs which will close them with certainty and quickly, even if they do bang. The use of hydraulic springs would be ideal but they are too costly for barracks; their use might, however, be considered in the case of hospitals where quiet is essential, provided some type that would give rapid action to the last could be procured. Springs on the hinges are fairly satisfactory if kept tight. A door fitted with a spring must also be fitted with a "stop" of some kind, else if the wind catches it, when partly open, it may blow back 180° from its position when shut, when the spring will have no power to close it. Automatic fastenings to the doors are also necessary so that when the door is shut it is secure against the wind.

All other openings, such as fireplaces, ventilators, key-holes, etc., must be protected, as anophelines are very persistent and will make every effort to find an opening through which they can enter a building, therefore a building with many small openings becomes not a protection but a mosquito trap. Frequently fully-fed mosquitos will remain in the places of feeding even when there is a clear way out, hiding in dark places, especially under the beds [9].

Having considered the mosquito-proofing of the whole building, one must now consider the protection of the individual occupants of barrack rooms by means of nets in those cases where mass protection is not possible.

Nets to be of any use must be made of a material the mesh of which will not allow mosquitoes to pass through; they must be light and easily removable and must be kept in a good state of repair.

There are three main circumstances in which nets may be used: (1) Outside in the open; (2) in buildings fitted with overhead electric fans; and (3) in buildings fitted with either electric or hand-pulled punkhas, or no punkhas at all.

In accordance with the calls for "military precision" the nets are now, in most cases, suspended from wires stretched along the barrack rooms, the issue of "poles, mosquito" having ceased. The use of mosquito poles certainly led to some untidiness; this was well described by "Mouse," one of the military correspondents of the *Lahore Civil and Military Gazette*, in the issue for September 22, 1930. On very hot nights it was possible for the men to take their beds out into the open, but now, being tied to

one long wire, individualism is destroyed and no matter how hot the night the man must remain inside the barrack room. That this "military precision" can be carried out to too great an extent was well shown when a medical officer whilst visiting a barrack room suggested that he would like to see the nicely "furled" nets lowered. This was done. There were no abnormal holes but he was surprised to see that some of the nets barely reached the beds and that it was impossible to tuck in the lower portions; he was then informed that this was due to the fact that the officer commanding the company had given orders that all nets were to be at the same level when raised during the day, and that as the tapes by which the nets were fixed to the wires were of different lengths the nets did not always allow for tucking in, hence the condition in which they were found.

With overhead electric fans nets should not be necessary providing that there is a fan for each bed or pair of beds. Fans if properly arranged should be sufficient protection against mosquitoes without the necessity for nets, but the number of fans provided in barrack rooms is quite insufficient.

There has been considerable controversy as to whether nets should be used in conjunction with punkhas; if nets are used in conjunction with punkhas, the latter have to be arranged at such a height that the man inside the net gets no benefit from them; the swing of the punkhas is very short, owing to the fringe being drawn up close to the frame, and the current of air so raised is not strong enough to drive mosquitoes away from the sides of the net at the level of the sleeper. The ordinary barrack bed is much too narrow, the result being that when a man is asleep some part of his body must be in contact with the net, and as the usual sleeping suit consists solely of a pair of short pants, mosquitoes can feed freely through the net. In a barrack room visited at night, thirty per cent of the men had some portion of the naked body touching the net, so probably during the night every man would lie in a similar condition.

If nets are not used the punkhas can be so arranged as to give a longer swing; they can be closer to the beds and, owing to the greater current of air so caused, mosquitoes will not be able to approach the men.

A solution of the problem "nets or no nets" might be possible by trying both methods in a unit, or better in one barrack room, men on one side of the room using their nets and those on the other being without nets.

There is, of course, the possibility of the punkhas stopping when the men are all asleep, with immediate mass attacks by the mosquitoes; the fitting of an automatic alarm which would rouse the men at once should the punkhas stop would overcome this danger, repellants being used until the punkhas were again in action.

Having considered the man in the barrack room one must now consider the man on duty.

Police and sentries, whose duties necessitate their being out at night, should be provided with mosquito-proof veils and gauntlets and should,

prior to going on duty, apply some form of repellant. The wearing of these veils is unpleasant, owing to the heat, but infection is most certainly prevented if they are properly put on.

The wearing of "shorts" and kilts is forbidden during the malaria season in the plains after sunset. Yet one frequently sees men wearing shirts with short sleeves; this should also be forbidden, and in those units in which the sleeves are cut off the shirts, the wearing of jackets after dusk should be enforced.

Cinemas, restaurants and dancing halls have all been blamed at various times of being danger spots where the men may become infected with malaria; while not denying this, it should be obvious to even the most rabid anti-malariologist that if, as has been frequently suggested, these places of amusement are closed or placed out of bounds, there would be a large increase in the number of cases of drunkenness and also in venereal diseases.

The question of the value of a prophylactic issue of quinine to all ranks was again raised, during 1930, at Ferozepore. As was expected, the results were of little value; the "controls," who took no part in the test, in most cases showed a lower admission rate than those who were taking quinine (Appendix IX).

Reference to the 1930 edition of the "Commentary on the Health of British Troops in India during the year 1929," page 9, shows that the proportion of cases of malaria diagnosed clinically is nine per cent, and disappointment is expressed that this has not been reduced. A comparative table is also given which shows "what can be done" in some stations. The issue of such tables is, in my humble opinion, unjust and liable to lead to just the opposite result to that which is desired. Peshawar heads the list of stations which do not return many cases of clinical malaria, but it is not mentioned that at this station there is a medical officer who does little else than anti-malaria work. So long as honest returns are sent in there is bound to be a certain proportion of cases of clinical malaria, but in those hospitals in which the commanding officer decrees that these cases are to be shown as "constipation, or something like that" there will be no cases of clinical malaria shown.

Summary.

Before any general work can be undertaken in India, it is essential that there should be a Central Department of Malariology at New Delhi and Simla. The members of the head committee should include a high official of the Civil and one of the Military branches of the Government; these would have as expert advisers, a trained malariologist, an entomologist, specially trained in mosquito work, who need not necessarily be a medical officer, and an officer of the civil or military engineering services who has been specially trained in anti-malaria work. An ample staff of clerks should also be provided.

These advisers should be available at all times in case any of the district committees need their expert opinion on any matter which could not be worked out locally.

Local committees and sub-committees should be formed; these would be responsible for the carrying out of local malaria surveys and for submitting maps and reports to the central body. It is suggested that these local bodies should control areas similar to those at present administered by the Commissioners and Deputy-Commissioners.

There would be a staff of experts on each of these local bodies, similar to that at headquarters. The sub-committees would be in charge of the various gangs which are employed in the actual anti-malaria works.

The strength proposed for each gang is one overseer, who has been specially trained in the work, with three coolies to do the work; each gang would comprise one "unit," and would deal with approximately one square mile of the area to which it belonged. The area would, however, vary to a certain degree according to the type of country under consideration; desert land would require little or no attention, whereas highly cultivated land, towns and cantonments would need a higher concentration of labour, as it is not anticipated that the average town or cantonment dweller will ever work up much energy as regards anti-malaria work, even if penalties for non-observance are imposed.

Each unit should be kept as much as possible to the same area, and should only be moved in cases of emergency, returning to its own area as soon as the emergency is over.

Five units should comprise a "squad"; this should be directed by a subordinate, corresponding in rank to an Assistant or Sub-Assistant Surgeon.

Two squads should form a "section," under the control of an expert with the rank of Lieutenant or Captain. In order to provide these officers, who must have undergone special training, applicants should be drawn from the R.A.M.C. and I.M.S., or from civil practitioners engaged either in England, India, or any of the Colonies. It is essential that these should be qualified men, as they would also be concerned in treating any cases of malaria with which they might come in contact.

These sections would all be under the local sub-committee, this being controlled by the committee of the district, which in its turn would be directly ruled by the Headquarter Committee.

When it was proposed that any anti-malaria work should be carried out, a full report would be submitted to the headquarters of the department, together with the estimated cost. The matter would be thoroughly examined and the necessary funds allotted if the scheme was sanctioned.

The local bodies would have no funds at all; all pay, cost of larvicides, and such charges being met monthly by cheques sent out from the headquarter office, on receipt of the usual claims.

It is realized that many of the suggestions made in this article are

utopian and cannot possibly be carried out, even should the millennium be reached, but they may put some ideas into minds more worthy than mine, so it is hoped that "out of evil may come forth, even the slightest, good."

Ferozepore has been taken as the basis of this article, as I have a greater knowledge of this station than of the others in the Lahore District, but the remarks contained herein could equally apply to several others in the plains.

It is hoped that this article may lead to a strong offensive on the part of other members of the Corps. Criticism will be gladly received, provided that it leads to action which will be beneficial to those suffering from, or likely to suffer from, "malaria in India."

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APPENDICES.

I. Distribution List of the Anopheline Mosquitoes found in the Lahore District.
II. Extract from a Report on "Malaria at Delhi," by R. Senior White.
III. Resolutions Passed by the Malaria Section of the Seventh Congress of the Far Eastern Association of Tropical Medicine, held in Calcutta in December, 1927.
IV. Copy of a Letter from the Senior Medical Officer, Ferozepore, to the Executive Officer, concerning action to be taken regarding wells in the cantonment area.

V. Table showing the Strata pierced by a Tube Well, at the Power Station, Ferozepore Cantonments.
VI. Some Natural Enemies of the Mosquito Family.
VII. An Experimental Mosquito Trap.
VIII. Table showing the Number of Fresh and Relapse Cases of Malaria amongst British Troops at Ferozepore, 1926 to 1930.
IX. Table of the Results of Prophylactic Quinine Issue, Ferozepore, 1930.

APPENDIX I.

Distribution List of Anopheline Mosquitoes in the Lahore District.

	A. pulcherrimus	*A. plumbeus* var. *barianensis*	*A. hyrcanus* var. *nigerrimus*	*A. barbirostris*	*A. listonii*	*A. jeyporiensis* var. *moghulensis*	*A. subpictus*	*A. fuliginosus*	*A. maculatus* var.	*A. willmori*	*A. maculipalpis* var. *indiensis*	*A. culiciformis*	*A. turkhudi*	*A. stephensi*	*A. pallidus*	*A. theobaldi*	*A. lindesaii*	*A. gigas* and var. *simlensis*	*A. culicifacies*	
A. Plains Stations—																				
Ambala ..							+					+		+					+	4
Amritsar ..	+		+	+	+		+	+			+	+	+	+	+				+	12
Ferozepore ..	+		+*	+			+*	+*			+	+	+	+*					+*	10
Jullundur ..							+				+			+						3
Lahore ..	+		+		+		+*	+	+	+		+	+	+		+			+	12
Lahore Cantt.	+		+	+			+*	+				+		+*					+*	8
Multan ..	+						+							+						3
B. Sub.-Montane—																				
Kalka					+		+			+		+					+		+	6
Pathankot ..									+	+	+						+			4
Sialkot ..	+						+					+		+					+	5
C. Hill Stations—																				
Bakloh ..										+			+	+			+	+		5
Dagshai ..													+							1
Dalhousie ..																		+		1
Dharamsala ..					+			+		+	+	+	+				+			7
Kasauli ..		+			+	+	+		+	+	+		+				+	+		10
Simla ..		+					+			+							+	+		5
Subathu ..										+										1

* Captured by the author.

APPENDIX II.

Extract from a Report on "Malaria at Delhi," by R. Senior White.

A. rossii.—Hodgson records finding this species as early as April; I did not take a single specimen until after the onset of the monsoon in July. Thereafter it was certainly the most common anopheline present. Though Gill (1925) records successful laboratory infections with it, with B.T., it has never been found naturally infected anywhere but in the Dutch East Indies, never in India. In this respect it may be mentioned that Gill bred his specimens, and it has been suggested by Williamson (1928) that there

may be a factor inhibitory to parasite development in foul water feeders, such as *rossii* in nature. The underlying reasons for this are now being investigated, by Williamson and Rosedale, at Singapore. Meanwhile I propose to follow all previous workers and my own practical results both in India and Ceylon, and completely ignore this species as a factor in malaria causation.

A. fuliginosus.—A proved carrier in India, but I fully concur with Hodgson that this species has not the slightest importance in malaria causation. Hodgson showed it to be essentially a cold weather species, though present throughout the year, and my findings agree with this. It has its minimum prevalence during the fever season. . . . That this is not a temperature effect alone, however, is indicated by heavy catches having been made both at 25° C. and at 32° C. Hibernating larvæ were numerous in a canal in Delhi Waterworks settling bed in January and February, but hereafter disappeared, showing that the species must have been prevalent at the end of the 1926 season. I have given reasons for neglecting it elsewhere. (S.W. 1928.)

A. stephensi.—This species apparently hibernates in wells and is found as a larva in natural waters with the first warm weather in February to March. Primarily a well-breeder, it is in reality extremely catholic in its tastes and, especially in spring, invades outside bodies of water, but after the onset of the monsoon it seems largely confined to wells, in which it is then extremely common. Whether there are any seasonal fluctuations in the numbers I have no data to go on. Hodgson seems to be of the opinion that there are, with a maximum during the rains. Sinton (1917) shows that at Kohat the curve of its prevalence follows rather closely that of B.T., and in view of the extreme rarity of the next species, before the onset of the rains, I think that there can be no doubt that *A. stephensi* is responsible for all the spring malaria in Delhi. Like its congeners of the *rossii* group it can unfortunately tolerate foul water. Whether specimens so bred can successfully carry malaria is another question.

A. culicifacies.—Found commonly as a fourth stage hibernating larva at the end of the very cold weather, but by the end of the third week in February the larvæ have pupated and emerged. Young larvæ were found in April, but the species was rare until after the onset of the rains; it was then common and continued so until the end of October. I fully agree with Hodgson's remarks about its breeding requirements, "The water must be fresh, not too deep, and if possible changed slowly but regularly. This is especially the case if pools are to continue to afford breeding grounds for a large number of the species."

Recent research has shown the reason underlying the last statement; it is that unless the water is changed, ammonia accumulates in the temporary pools that form so much of the breeding area of this species to an extent inhibitory to its development, when the anopheles present changes from *culicifacies* to *rossii*. On the other hand, if these pools are continuously

diluted by fresh rainfall the water remains suitable for *culicifacies*, which then breeds in increasing numbers.

This, in my opinion, is the true relationship between the rainfall and epidemic malaria. I am further of the opinion that *culicifacies* alone is concerned in the causation of epidemic malaria in the Punjab.

APPENDIX III.

Resolutions Passed by the Malaria Section of the Seventh Congress of the Far Eastern Association of Tropical Medicine, held in Calcutta in December, 1927.

(1) The Malaria Section of the Seventh Congress of the Far Eastern Association of Tropical Medicine are aware of many instances of a great increase in the incidence of malaria caused by the facilities given to mosquito reproduction by engineering works, either during construction or afterwards, due to the different conditions brought about.

This Congress is of opinion that plans for railways, canals, harbours, and all similar engineering works likely to affect the conditions producing malaria should be submitted to the proper Public Health Authorities and their Sanitary Engineers before being sanctioned by the Governments.

(2) As it has been represented that difference of opinion regarding the best method of controlling malaria sometimes causes doubt in the public mind and so may hamper the progress of anti-malarial work, this Congress takes the present opportunity to emphasize the fact that there is no single method of malaria control applicable to all conditions and all countries.

Nevertheless, they consider that for towns, mines, plantations, large public works and similar aggregations of people, the control of the breeding places of the malaria-carrying species of mosquito is a method which should be employed whatever other anti-malarial measures are put into force. Whenever possible, this control should be effected by permanent works which eliminate entirely the sources of mosquito breeding.

For wide rural areas, especially those with scanty, poverty-stricken populations, the first step in the control of malaria is adequate research, so that conditions present may be ascertained and the best methods of control under the particular circumstances ascertained as a result of such research. Methods of prevention may here be of great variety and include drainage, flooding, jungle-clearing, jungle-preservation, bonification, the promotion of agriculture, improvement of housing, and the general economic conditions, education, etc., of the people.

The systematic killing of infected adult mosquitoes, screening, the use of anti-malarial drugs and a host of special methods, have each also to be considered in their proper application.

The Congress desires to stress the need, not only of thoroughly trained Malarial Research Officers, but of expert Malarial Engineers in whichever type of malaria prevention is at stake.

APPENDIX IV.

Subject : MALARIA. No. 9/M/29.

Office of the Senior Medical Officer, Ferozepore,
July 26, 1929.

To the Anti-malaria Officer,
Ferozepore Cantonments.

The following anti-malaria works are recommended and should, I think, be met from cantonment funds, except in those cases where landlords can be made to pay :—

(1) All wells worked by charsa to be done away with, iron Persian wheels being substituted.

(2) Wooden Persian wheels to be replaced by iron wheels. The well tops to be covered in, only an opening for the wheel remaining. The M.E.S. might evolve a mosquito-proof cover for the wheel, removable when repairs are needed ; the water exit to be protected by a flap valve.

(3) Drinking and bath water to be obtained from tube wells in each compound.

(4) All disused wells to be covered in.

(5) "Sumps," in gardens, to have movable mosquito-proof lids.

(6) A considerable amount of the anti-malaria grant appears to be expended on the repairing of existing drains ; it is very doubtful whether this is a legitimate charge against the grant. The only drains that should be charged for are those specially constructed for draining "diggies" and other collections of water, which are in evidence in the malarial season.

The reason for my suggesting (1) is that every well worked by charsa has a bullock run which invariably acts as a breeding place for anophelines during the rains. Bullock runs should be filled in.

J. E. M. Boyd,
Major, R.A.M.C., Senior Medical Officer, Ferozepore Bde. Area.

Copies to :—

The Headquarters, Ferozepore Brigade Area.
The Executive Officer, Ferozepore Cantonments.

APPENDIX V.

TABLE SHOWING THE STRATA PIERCED BY A TUBE WELL, AT THE POWER STATION, FEROZEPORE CANTONMENTS.

	At feet
Ground level	0
Excavation, earth	16
Sand	16— 31
Fine sand with nodules of clay	31— 33
Sand, coarse	33— 38
Sand interspersed with nodules of kunkur	38— 56
Pure sand	56— 59
Sand with small kunkur	59— 64

	At feet
Large lumps of kunkur	64—66
Sand, with very little mixture of clay	66—84
Stiff clay	84—108
Fine sand with slight clay	108—111
Slight course of sand	111—121
Sand with fine kunkur	121—123
Sand with trace of small nodules of clay	123—134
Sand with small kunkur	134—138
Kunkur	138—140
Sand, gravel and clay	140—144
Clay	144—158
Sand and stiff clay	158—169
Clay	169—178
Sand	178—192
Nodules of clay	192—203
Sand	203—210
Fine sand	210—218
Clay	218—221
Fine sand with nodules of clay	221—235
Fine pure sand	235—240
Sand	240—243
Sand with nodules of clay and kunkur	243—244
Sand	244—250
Stiff clay	250—256
Hard clay with nodules of kunkur	256—263

APPENDIX VI.

Some Natural Enemies of the Mosquito Family.

Plants of the bladderwort group.

Fungi and bacteria, the empusas and yeasts.

Protozoa, gregarines, flagellates, spirochætes.

Other lower animals, as Hydra.

Vermes, trematodes, nematodes.

Water beetles, Dytiscidæ, Hydrophilidæ, Gyrinidæ, Nepa, and other arthropods.

Dragon flies, adults feed on adult mosquito and the larvæ on mosquito larvæ.

Culicidæ, Psorophora, Megharinus, Lutzia, are voraciously carnivorous and even cannibalistic, as larvæ.

Corethrinæ, sp.

Chironomidæ, sp.

Empididæ, sp.

Scatophagidæ, sp.

Simulium.

Wasps, sp.

Arachnidæ, mites of the Hydrachnidæ, spiders.

Other arthropods, as small crayfish, fresh and salt water shrimps.

Batrachians, frogs and toads eat the adult mosquito, tritons.

Reptiles, gecko lizard in India.

Birds, goat suckers, including night hawks, American swift, the true swallows, flycatchers. Aquatic birds are also useful in destroying eggs and larvæ, as the spoonbill duck and the mallard. Shore birds which eat the larvæ include the phalaropes, sandpipers and small plover. (Fifty-three per cent of the food of twenty-eight northern phalaropes from one locality consisted of mosquito larvæ.)

Bats, all species.

Fish, all surface feeders of the minnow class, also roach, goldfish, perch, and others.

(Further information on this subject can be obtained by referring to "The Mosquitoes of North and Central America and the West Indies," by Howard, Dyar and Knab, from which many of the above statements have been extracted.)

APPENDIX VII.

An Experimental Mosquito Trap.

When stationed in India some few years ago I was trying to evolve a method for destroying sandflies and mosquitoes, and the idea of some form of mechanical trap, similar to the one described below, seemed feasible. Unfortunately, I have so far been unable to test the value of the trap.

The idea first occurred to me when I was visiting a large electric light station during the hot weather. I was surprised at the coolness of the place, and on looking round found that on either side of the door were kuskus screens, with several electric fans behind each. The fans were so arranged that when in motion they sucked air through the wetted screens, the air being cooled in transit.

It has been proved by many observers that many insects are attracted by light; one has only to place a lamp over a bath containing water during the swarming of white ants to demonstrate this, or to rub a little vaseline or such like substance on to the globe of a hand lamp, when in a very short time many small insects will be seen to be adhering to the glass.

So it occurred to me that if a combination of some such apparatus could be arranged a useful insect trap would result; it would be easy to make and could be assembled as follows :—

The first requirement would be a small wooden box, from which the front and back portions had been removed.

In place of the front of the box would be placed a cone-shaped structure, made of cardboard, the apex being inwards and having at the apex a small hole. The back of the box would be replaced by wire gauze, with a mesh sufficiently small to prevent the passage of any insects. In front of the large end of the cone would be placed an electric light, and behind the gauze an electric fan, so made as to cause a strong suction action.

When the light is turned on insects will be attracted by the light and

will be drawn into the box through the cone by the electric fan, remaining in the box until they are needed for examination.

APPENDIX VIII.

Table showing the Number of Fresh and Relapse Cases of Malaria, amongst British Troops, at Ferozepore, 1926 to 1930.

Months	1926		1927		1928		1929		1930	
	Fresh	Relapse	Fresh	Relapse	Fresh	Relapse	Fresh	Relapse	Fresh	Relapse
January ..	1	9	2	8	—	7	2	3	—	5
February ..	—	14	—	4	3	2	—	3	—	1
March ..	—	7	—	2	1	4	—	4	—	2
April ..	—	15	—	9	7	5	2	3	—	3
May ..	4	7	—	18	3	8	1	1	—	9
June ..	3	8	4	10	—	4	—	2	6	15
July ..	—	10	1	13	1	9	—	5	18	18
August ..	7	18	3	11	4	8	13	6	57	26
September	11	33	12	3	14	4	30	11	33	16
October ..	10	8	6	15	22	18	24	13	41	24
November..	17	14	17	13	63	23	58	34	32	21
December	6	8	8	14	8	9	8	14	6	6
Totals ..	59	151	53	120	126	101	138	99	193	146

APPENDIX IX.

Results of Prophylactic Quinine, Ferozepore, 1930.

September, 1930.

Units	Strength	(A) Number taking prophylactic quinine	Percentage of malaria admissions from (A)	(B) Controls	Percentage of malaria admissions from (B)	Actual admissions from (A)	Actual admissions from (B)
2nd R.S. Fus.	233	180	13·89	53	5·66	25	3
91st Field Battery R.A.	114	94	11·70	20	5·00	11	1
20th Med. Battery R.A.	80	60	11·67	20	*Nil*	7	—
Staff and Depts.	73	26	3·85	3	*Nil*	1	—
						44	4

October, 1930.

Units	Strength	(A) Number taking prophylactic quinine	Percentage of malaria admissions from (A)	(B) Controls	Percentage of malaria admissions from (B)	Actual admissions from (A)	Actual admissions from (B)
2nd R.S. Fus.	292	222	15·32	70	15·71	34	11
91st Field Battery R.A.	111	81	9·88	20	10·00	8	2
20th Med. Battery R.A.	80	60	8·33	20	5·00	5	1
Staff and Depts.	79	25	4·00	3	*Nil*	1	—
						48	14

THE DOCTOR'S WAR.

By D.A.D.M.S.

Part II.

(*Continued from p.* 207.)

War and sanitation are incredibly mixed up together. So of course fifty per cent of our work was improvising and fixing up sanitary gadgets. Certain receptacles that have to be used by people who, for the time being, are bedridden, have to be dealt with rapidly and efficiently in a hot country where flies are abundant. My sanitary expert built with empty kerosene oil tins, filled with earth, little sanitary annexes that were marvels of efficiency and even sightly to the eye. The floors and walls were made with oil tins burnished and polished to a wonderful shininess, the roof of corrugated iron was painted pure white, the windows of the house stood open and, as a last æsthetic touch, the keepers of the houses vied with each other in keeping flowers blooming in the window frames. Every visitor to the hospital was shown round the neat annexes!

As the summer months passed away into autumn our work increased. September and October were bad malaria months, strangely like India.

As November came along down went the numbers and everybody began to feel fit and well in the crisp cold. Now we had to consider keeping the hospital tents warm as the winter advanced, and winter *is* winter in Macedonia; cold can be intense, snow common and blizzards frequent. Our only method of heating was by the homely "oil stove," efficient enough if tenderly cared for, but the soldier is not accustomed to deal with mechanical toys. Consequently oil stoves went out of order with much regularity. At last the Quarter-master started a repair-shop where non-functioning stoves were dumped and reliable ones taken in their place. Of course the oil stove at once raised the question of fire. Put 1,500 patients and 300 staff under canvas in a cold climate for six months at a time and you will soon realize what a fear of fire grows up. Luckily for us the only conflagration we had was in the orderly room tent. In the early hours of a cold morning an excited and breathless private burst into the tent of my Registrar and stammered out, "I'm afraid I have bad news for you, Sir." "Well, what is it?" asked the startled officer, expecting to hear at the worst some terrible catastrophe—"Sir, the orderly room is burnt to the ground." Such events have their disturbances *and* uses. For months after the fire one could reply to irritating requests concerning trivial official matters, "Regret to state all correspondence on this subject was destroyed by the fire." And that settled that!

Winter was now upon us and we had uncomfortable times. One storm

of wind and rain blew down the tents of the female nursing staff and the poor girls had all their belongings soaked and themselves much incommoded. Luckily bright sunshine followed the storm and next morning could be seen fair maidens wandering round their tents in fancy pyjamas, collecting blown-away articles of raiment.

I went up to the Doiran front to stay with a friend who was A.D.M.S. of a division. With him I visited the lines and saw the far-off impregnable positions of the Bulgars. Our positions were on the plain and the Bulgars sat on the slopes of the hills and looked down at us. It was not a ferocious warfare up there; a good deal of "live and let live" about it. At one point the English in their quaint way had laid out a golf links and built a golf house of sand-bags. Visitors were requested to "park cars behind the golf house, as exposure might lead to hostile shell-fire." Football grounds existed in full view of the enemy, and the Bulgar benevolently allowed matches to be played, but when the grounds were used for parades he sent over a 'plane to drop messages that such war-like proceedings would have to be interfered with if persisted in. But do not gather from such an account of war that the Salonika front was a picnic; not by any means, officers and men lived in the most primitive way in shacks and shelters in ravines, with intense heat in summer and terrible cold in winter. There were no out-of-the lines billets, no villages or towns behind the front to rest in and no leave; one short leave in two or three years was the maximum and that did not come to many. When fighting was in progress it was very deadly; attacks on positions dug into solid rock and frowning down on the attackers. Advances over fire-swept open plains, and exhausting struggles up steep hill-sides. Every attack meant heavy losses and little gains. The Bulgar had only to retire a little higher up the mountains and be as impregnable as before.

It was a weary war and monotonous in the extreme. But, as ever, the British soldier made the best of it; concert parties were given and even set pantomimes were staged and played at the front, and very good shows they were. For officers there was duck-shooting in the marshes, but the competition was keen. You tried to pick a good spot where the duck came in and keep very quiet about it, but soon found that other people had found your pet place and shot it up before you.

All inspecting work was done on horseback; long rides over desolate country to visit some advanced dressing station tucked away in some fold of the ground behind the trenches. There was so much open ground to cover that one felt more exposed than on the French front; at times one would ride over a rise and see the enemy lines quite plainly; one would be warned to move fast and get out of sight quickly as the Bulgar kept his field guns trained on such places and sniped you with a few shells just to let you know he saw you all right. There was very little rifle or machine-gun fire and there was a silence unknown on the Western Front. An uncanny silence and the feeling of being constantly watched.

I returned to Salonika for Christmas. We put up a great show for the patients. Turkeys were obtainable and plum-puddings from the Expeditionary Force Canteen. All patients fit for it were put on stout or beer for that day and we made the best of our exile. My wonderful matron was taken away from me—a sad event; her relief was not so tactful with the rebellious V.A.D.'s and many minor worries arose. The new matron failed to grasp the fact that young girls accustomed to an independent home life could not be treated as naughty irresponsible children, or dragooned like probationers in a London hospital. The only way to treat these young women of the world was to put them on their honour; certain things were "not done" and that was all about it. If they disobeyed it brought odium and contempt on the hospital—*their* hospital. That was quite enough, they could be confidently trusted to behave in a rational manner.

Once in a while one went to Salonika and dined at the *Cercle Militaire*—the excellent French Officers' Club, where they so kindly made us welcome. Incidentally, later on the British Army started an Officers' Club of their own and did *not* make our Allies honorary members. After dinner one went to La Tour Blanche. There was to be seen a somewhat sordid cabaret show—but the interest was in seeing all our dear Allies together—French, Italians, Russians, Greeks, Serbs and a motley collection of Levantine civilians of all sorts and shades.

Salonika could produce a night-life of its own in no way different from other Continental towns. One evening the A.P.M. took me round the town; he had an extensive knowledge of all the drinking dens and vice haunts as part of his professional duties. "This," said he, as we approached a swinging door, "is a particularly noisome resort." So speaking, he pushed open the door and we saw two merchant sailors fighting fiercely, surrounded by an admiring crowd of dagoes and demi-mondaines. The A.P.M. let the door swing shut again and walked quickly away. "No place for an A.P.M.," he remarked.

Perhaps the Near East affects people living in it with a cheap idea of human life. One day near our hospital we found a dead Greek. The body had been considerably hacked about with knives, and it was obvious the man had died a violent death. Feeling like Sherlock Holmes, I gave strict orders that the body was not to be disturbed until the police had investigated the crime. Soon three Greek gendarmes arrived. I pointed out where the body lay and left them to their investigations. In an incredibly short time they sauntered back, and the senior gendarme politely requested the loan of a spade. "A spade," I asked. "But why a spade?" "For the purpose," replied authority, "of burying the deceased." But, said I, "Is there to be no inquiry, no inquest, before you bury the dead man!" "But no," said the gendarme, "the man is dead, it is only necessary to bury him!"

Our friends were inclined to do a bit of pilfering as opportunities

arose. One gallant scientific expert arrived from England to investigate the habits of the anopheles mosquito. Being a scientist, he had embarked for Salonika in the clothes he wore (civilian kit), and with a small suit-case containing a change of undergarments. We put him up in the mess and gave him a tent to sleep in. After his first dinner with us he retired to bed and disposed his one suit on the pegs of the tent pole. Next morning at breakfast I received a message that our guest would like to see me in his sleeping tent. I feared the poor man was ill and hastened over to visit him. I found him in bed attired in a suit of brilliantly striped pyjamas, but beyond himself and the bed the tent was completely empty. Some thief in the night had visited him and removed the one suit and the suitcase complete. As we could not allow even a scientist to go about his work in pyjamas, we made up covering for him by borrowing a coat here, a pair of trousers there, and so on, until he could decently appear. To add insult to injury the lounge suit was discovered in a dry ditch a few days later. Evidently the thief had gone through the pockets, but had not considered the clothing worth taking! We put the famous suit through the Thresh steam disinfector, and returned it, somewhat crumpled, to our unperturbed guest.

Though at the base of operations it must not be gathered we were free from war alarms. Brother Boche had a habit of coming over by airplane to bomb the camps and harbour shipping. On these occasions we were treated to the return shower of shrapnel and shell nose-caps from the anti-air craft guns, if not to the actual bombing. Shelter trenches were dug for the nursing staff and on the alarm sounding they were supposed to take shelter. Patients were taught to leave the tents and scatter on the hill-side. Helpless patients were put under their beds. It seemed poor protection, but on one occasion a shell-cap dropped neatly on a bed making a deep funnel in the spring mattress but not going through. Of course our Nursing Staff were indignant at the idea of being driven to cower in trenches and did their best not to take advantage of protection. One of our hospitals nearer Salonika was badly bombed in 1917 by the famous Richthoffen Red Circus flight and had many casualties. The site of the hospital was unfortunate, being next door to a large ordnance depot and no doubt the hospital was not deliberately attacked.

For the first time in the Great War I met the lady doctor on active service. At a concert party I sat next to a young woman wearing an expensive-looking fur coat. I took her for a V.A.D. in plain clothes but could not quite follow her conversation, ranging as it did from Lake Doiran at the front to duck shooting on Lake Langaza. It seemed a wide field even for a V.A.D. to cover. At last I asked her point blank how she managed to wangle all these interesting adventures from her routine hospital duties. Then she explained that she was a doctor, and as such free to roam as she wished. One O.C. hospital was asked at a conference how it was his monthly expenditure on petrol for motor ambulances exceeded all other units. His

explanation was simple. "I have," he said, "the honour to number among my staff young and attractive lady doctors; these ladies must be amused and given fresh air to keep them healthy, so weekly excursions up country are a necessary part of my hospital routine."

Several times I visited the general hospitals provided by us for Serbian troops. These hospitals were staffed by British doctors, nurses and R.A.M.C. personnel, but administered by the French. The personality of the O.C. counted for everything; if the French liked him he got anything he wanted. I had a friend, O.C. of one hospital, a tall genial officer and covered with war medals and decorations. He had spent the early days of his Service in the Egyptian Army, that happy hunting ground of medals. His French was to the point but not extensive. Wanting a new kitchen built in the hospital he took the French officer responsible for "new construction" to the place where he wanted the building. He stopped, drove his stick into the ground, and said, "*Cuisine ici.*" It worked all right. The wounded or sick Serbian was a patient, cheery soul and very grateful for the treatment he received. Poor souls, their beloved country was occupied by the hated Bulgars; many of them had not heard a word of their wives and families left behind in the retreat into Albania in 1915; dead or alive they knew not, but they never gave up hope, hung on to the little strip of Serbia left to them and stuck out those cruel winters in frozen trenches. As a people the Serbs are very adaptable, they can turn their hands to any work and are industrious in the extreme. The O.C. of a Serbian hospital could get anything done, skilled workmen were there for the asking. My genial friend had started a golf links to amuse and exercise his staff. On the links was a hut occupied by a Serb patient who made golf clubs as well as any professional.

As 1918 wore on a new idea of malaria prevention was put in practice, that is the dropping of the wholesale doping of troops with quinine as a preventive. Quinine had been given in 1915, 1916 and 1917, and still the sick-rate from malaria continued to be very high. It was obvious that men drenched with quinine for four years were getting resistant to the drug and also anæmic and debilitated. So the argument was, let them alone, do not give them quinine, and *when* they get malaria the drug will act more powerfully and cut short the attack, prevent relapses, and allow the victim to get well quickly. At any rate 1918 was a better year, and until that terrible influenza epidemic swept the whole world the sickness was kept within bounds. But there is no doubt malaria has its good and bad years; any Indian soldier will tell you that. For some reasons not yet clear, but probably influenced by temperature and humidity, one year will be a very bad malaria year and then the next will be a comparatively healthy one. So new experiments in prevention have a habit of striking a good year and raising hopes that are dashed as time goes on. We were also relieved of many of our chronic cases by a wholesale weeding out and invaliding of the worst patients. Hospital ships were running again and

men could be sent home. This invaliding scheme was a great secret and was called the "Y scheme," never alluded to as "invaliding" because the men might hear of it and go sick with the object of being sent home; so a man marked "Y" was supposed not to know the significance of this lettering; of course they knew all about it, but the little fiction was carried on.

Not the least interesting part of my hospital was the newly established "neurological section." This was a part of the hospital set apart for cases of "shell shock." Such cases were put in ambulances as soon as the shelling, explosion or whatever it was that caused the condition was over, and driven straight from the front to my hospital. There the patient was put in a tent by himself under one special nurse, treated by one specialist and kept rigidly apart for some weeks. The idea underlying all this was that sympathetic interest of listeners encourages the patient to dwell on his experiences and relate them to everyone about him. By so doing he keeps the particular event alive in his own mind and mentally goes through the "shock" again and again. Under our conditions the patient commenced to forget about it, and time healed the mental wound as nature heals a physical wound. I think it worked well. The Consulting Physician to the Army took much interest in this development and gave much of his time to it. The medical officer in charge of the section worked very hard, he kept the most voluminous notes on each case, and was to be seen daily hurrying from tent to tent with large tomes under his arm.

Another special section was the "dysentery block." In the Near East the common or garden domestic fly is as big a curse as he is in the Far East. All spring and autumn we waged war on the pest; as in India, the very hot months of July and August were comparatively free from the pests. But do what we could the fly was a great worry to us. We discovered that at night many sleeping flies collected in the tents on the inner lining of the roof; using bunches of blazing tow soaked in paraffin, and sweeping the flame rapidly over the tent surface, we killed millions of flies without burning the tents. We took immense care of all feeding utensils; knives, forks, spoons, &c., were boiled after each meal, but it was all a matter of detail. One had to go about and constantly look for loopholes. I found one rather unpleasant one: I saw an orderly washing up feeding utensils in a large basin. I didn't quite like the look of that basin, so I asked him if the basin was used for any other purposes. "Oh yes, sir," he cheerfully replied, "I use it for washing the corpses before they are taken to the mortuary." That reminds me of the bill given to all private patients leaving a large civil hospital in India. The bill was a printed form and all the usual details (such as medical attendance, nursing, dressings, etc.) were put down with the cost, and at the end came, "To one shroud, ten rupees." My wife received one of these accounts as she lay in bed waiting to be removed after an operation. "Well," she said to the Eurasian nurse who brought the bill, "I shan't want that last item at any rate." "Oh, no," said the little nurse, without the shadow of a smile, "not this time, memsahib!"

I took an opportunity of making a motor trip to the Serbian front; the object of the journey was to inspect the medical arrangements and sanitation of the Royal Army Service Corps units attached to the Serbian Army. It was very interesting; one realized the type of mountain warfare the Serb had to fight. The difficulties of conveying rations and ammunition were extreme, and most of the work seemed to be done with small Ford lorries. These little things climbed up and down the mountain passes in the way Ford cars can do, and did the work well. I visited several Serbian field ambulances. As the war was stationary at that time the ambulances acted as small stationary hospitals. Everything was improvised and built from material at hand: offices, wards, operating theatres, quarters for officers and men were made of wattle and mud, or in some cases they were elaborate stone houses. The Officer Commanding was a charming person; he insisted that we should stay to lunch, promising us an omelette and a bottle of wine. The house was of rough stone with a loft above the living room. Having called his soldier servant and ordered lunch, the O.C. left him to his own devices. We saw the servant run off and return with a ladder. He propped this against the wall of the house, climbed up to the loft and descended with his helmet full of eggs. There was much cackling and fluttering overhead as this commissariat work was carried out. We had soon an excellent omelette put before us.

The Serbian doctors were gloomy about the war. Would they ever get back to their own country and see their wives and families again? Four long years of silence. What an extraordinary gap in life! To be suddenly cut off from your home, family, friends, work, familiar surroundings, your very country, and to have that curtain drop for all those years. Even if one goes to jail for four years letters are allowed, relations and friends can come and see you, and in a way you keep touch. But this was absolute and complete separation, and with the dreadful feeling that their dear ones were at the mercy and under the absolute control of a hated enemy. No wonder our poor doctors were gloomy. And yet, if they had known it, all the suspense and tribulation were soon to be over. For the Bulgar was the first of the Central Powers to crack, and once shifted from his mountain trenches the Serb gave him no rest. It was the Serbian Army that swept all before it and fairly raced the Bulgar out of the country. I was back at Salonika when the news came of that great offensive that undoubtedly finished the war. The British made a desperate attack at Doiran. Once again we stormed the Grande Couronne positions and lost heavily. There has been nothing like it since Buller battled with the Boers for the Tugela Heights. We were repulsed, but our attack held the Bulgar down and the Serb and French broke through. We found the Bulgar gone and followed him up. I had no part in this, I was back at my hospital, and there fell upon us that ghastly influenza epidemic. The army was on the move and all the carefully worked out anti-malaria plans went by the board. An army on the move cannot spare time for reducing the mosquito breeding facilities of the

country it is marching through; carrying mosquito-proof curtains to fix inside shelter tents is also impossible; all the details of personal protection are forgotten, and men get infected in large numbers. To add to the malaria came the influenza of 1918. Not the more or less mild sort of bad cold we had been accustomed to call "influenza," but a virulent type of broncho-pneumonia that could kill a man in four days. Large convoys of sick came down the line and the hospital was crowded out. Luckily I had obtained from the Y.M.C.A. an immense tent which we used as a recreation room for patients; a room for reading, writing and playing games. I turned this big tent into a ward for semi-convalescents, men still too sick and debilitated to go to the convalescent camps, and by making full use of this "clearing house" kept my wards working to full capacity, but not overcrowded. The officers' wards were very busy; this influenza seemed to strike the officer even more hardly than the men. Quite healthy looking young fellows came in, developed broncho-pneumonia, and died in a few days. The distressing thing about it was that they remained quite clear in their minds, spoke rationally and joked and laughed a few hours before the end came. Of course most of these young men had been in Salonika for years and malaria had taken its toll of them. Their resistance was weakened.

I have said nothing of the actual ending of the war. I am afraid everybody was rather apathetic about it when it did come. Somebody from G.H.Q. rang up on November 11, and gave us the news of the signing of the Armistice by the Germans. The news spread round the tents and a few raised a feeble cheer. For the Salonika Army the war had ended in the defeat and retirement of the Bulgars. Up till Christmas we worked hard at our doctoring and then things slacked off as malaria and influenza faded away. In January I was moved from my hospital and given a staff job at G.H.Q. This meant living in a flat in Salonika and spending long hours in an office. It was interesting because one came into the phase of closing down hospitals—there were seventeen big hospitals in Salonika—dealing with demobilization of personnel, and yet doing the routine medical work of the army that was slowly fading away. The work was hard. Office 9 a.m to 1 p.m.; lunch; inspecting by car in the afternoon; back to office at 5 p.m., and then came the real work. Our chief was a man of dynamic energy with an utter contempt for fixed hours. Frequently he did not return to his office from his far-flung inspections until seven or eight o'clock in the evening. We, his staff, had to stand by with innumerable files awaiting his personal decision. Say his bell rang at 8 p.m., there was then a dashing up and down and to and fro until 10 p.m., and then we went home for dinner! At first I felt faint with hunger, but later on got quite used to dining at 10 p.m.!

One job that kept us busy was sending quantities of medical stores and hospital equipment to South Russia for General Denikin's force engaged

in fighting the Bolsheviks. Ships were loaded up with all sorts of war gear and sent off to Novorossiysk, a port in the Black Sea. The work was done by a corps known as the Inland Waterways and Docks. I dare say they knew a lot about inland waterways but I don't think they knew much about medical stores. The first consignment was put in the bottom of the hold of a ship and the remaining space filled in with heavy guns and ammunition. Long afterwards we received bitter complaints from the South Russian Mission to say the medical stores arrived in a very crumpled and useless condition. As the Salonika Army changed to the Army of the Black Sea the principal part of G.H.Q. prepared to move to Constantinople. For the time being I was left behind in my job at the Salonika base. Our mess in the flat was broken up and we moved out to live with one of the few remaining hospitals at Kalamaria. We were back again in tents, but in much more pleasant surroundings by the sea, away from smelly Salonika. As the army dwindled and ground formerly occupied by troops became vacant, the inhabitants of the country became more daring in their methods of thieving. It seems almost incredible, but the hospital we lived in had to be protected by a fence of barbed wire, not a few strands of wire, but what was known as an " apron " fence, the sort of thing used in front of trenches, and behind this barrier Serbian sentries patrolled. They were armed with rifles, and at night carried pistols for shooting up flares. It was quite usual at night to hear the bang of a flare go up followed by five rounds rapid from the Serbian sentry; just to warn off any marauders creeping up to the fence.

It was now well on in 1919; G.H.Q. had gone to Constantinople, and we had a Base Commandant to rule Salonika. My old hospital was closed down and deserted. I drove up there one day and viewed the empty site. As I gazed Macedonian shepherds fed their flocks on the old ground and busied themselves in removing any bit of wood or tin that was left. I saw our fine theatre being demolished, and my pretty little houses being removed piecemeal. I was rather sad about it. After all it was my show, commenced from nothing, lived in and worked in for two years, and full of memories of hard-working and loyal friends who made the hospital what it became, and after all it was the show hospital of Salonika. G.H.Q. frequently sent visitors to see it, distinguished visitors came to see us, and we thought a good deal of ourselves. My next move was to get some home leave; I had not seen England for two and a half years and I was anxious to get home. I got leave and had two months at home. Most of the time I spent at Eastbourne. Except for again leaving my family, I was not sorry to leave England.

I crossed via Calais and entrained for Rome, Taranto, and Constantinople. I shared a very small wagon-lit with another officer. On the journey through Italy we quickly sensed the Red spirit that was then rampant, before Mussolini took things in hand. On the train, service was given grudgingly, but tips were expected, the beds were not made up in the

carriages, food was bad, thrown at you, and the waiters sulky and rude. When we complained we were told "we were lucky to get any attention, very soon we should get none at all." At Rome the R.T.O. told us we should get on at once to Taranto, go into the rest camp there and wait for a ship to Constantinople. Knowing rest camps and the reputation of Taranto as a resting place we demurred. "Could we not remain in Rome until a ship was due to leave Taranto?" The R.T.O. said the Base Commandant at Taranto would not allow this. Being now well infected with Bolshevism ourselves we objected again. Could not Base Commandant be asked by wire if he would allow two senior officers in the Medical Service to remain in Rome at their own expense until a ship was due to leave for Constantinople? The badgered R.T.O. agreed to send the wire if I signed it. It was done and we went off to a hotel. It was much too hot in Rome to be very pleasant, but we saw all the sights and amused ourselves considerably. After a few days had elapsed without any reply from Taranto we grew less Bolshie and again approached the R.T.O. He had no information, but hinted darkly at the terrors of the Base Commandant. We braved it out a few days more and then embarked ourselves for Taranto. On arriving at that delectable place we duly reported to the Base Commandant. He said nothing about my telegram from Rome and seemed to care less. So I said nothing. What we did find out was that a boat was sailing for Constantinople that evening. With a bit of wangling we got it fixed up and embarked that same day. We found our ship to be a war-worn Liverpool—Belfast passenger steamer. There was little cabin accommodation and the whole boat was filthy. I shared a small cabin with my companion and found the so-called bedding so foul that I put a coat on top of the bunk and slept on it. The cabin was full of bugs. The same spirit existed on this ship as on our train journey. However the weather was warm, the sea was calm, and we made the best of it. We sailed through the Corinth Canal to Salonika and on to Constantinople (everybody in the Black Sea army talked of Constan, the whole Constantinople was too long). At the entrance to the Dardanelles we stopped a few hours at Chanak. Passing Gallipoli was interesting, but the dried-up barren brown hills gave up none of their secrets; they were barren hills and that was all.

We arrived at Constantinople at dawn on a summer morning. There are few sights so enthralling. I gazed through the porthole of my little cabin and was struck dumb with the splendour of it. A turquoise sea washing marble steps of glittering eastern palaces was the first impression. Taking more time over it one could pick out salient points. Slate-coloured mosques surrounded by tapering minarets stood out against a rose-pink sky. Real marble palaces stood above terraced gardens dipping to the sea. All around one floated innumerable boats with all the colours of the rainbow reflected in the sparkling water. I can only describe it like that. Always the Bosphorus had that sparkling life-like effect—it glittered, shone, radiated. It is the

most intensely alive piece of water I have ever seen. When you swim in it you learn more about it. The water is in layers. You strike a warm patch coming up from the Ægean Sea, tropical, languid. In a second you are swimming in cold water coming down from the Black Sea; it gives you a shock at first, but the sudden changes of temperature convey an extraordinary feeling of well-being. That is why the fish from the Bosphorus are so firm, nothing soft about them like most warm-water fish. There before my eyes lay the great city bathed in the clear air of the early morning. The most wonderful site of any city in the world. Anything could be made of it: the beauty spot and playground of Europe.

We disembarked and I got a lift in a car to G.H.Q. One quickly realized one belonged to an Army of Occupation. On landing at Galata quay we found the accustomed routine of the embarkation staff carried on in very unimposing shacks and surrounded by a clamour of civilian traffic from disembarking ships along the quayside. I had my first view of the Turkish hamal or porter. An oldish man, bearded, ragged, brown, bandy-legged, was loaded up with a large packing case. Four fellow porters were raising the case while the old man stooped underneath to let the case come to rest on the thick leather saddle-like pad which porters carry on their backs. The case was got into position and fastened with straps. Then with bursting grunts the old man took the full strain and with stiff jerky steps carried off this immense weight. Later on I had to move house, or rather flat, from Constantinople to Feneraki on the Asiatic side. Hamals were engaged. They just walked in and picked up the furniture, took it straight down to the quay and put it on the boat. No carts, no lorries, just hand carriage from door to ship, and no breakages.

The fine drive from Galata up through Pera is quite exciting. From the dock side you strike into the narrow winding main street leading up the steep hill to the Grande Rue de Pera. At once you are swept into roaring traffic. Motor cars, carts, horses, oxen, camels, electric trams, every conceivable sort of vehicle rushes, crawls and meanders up and down. The teeming population of all the places of the world jostle and push and escape sudden death by a miracle. Every motor car hoots and honks and cuts in round trams or past carts with great impartiality. In the Rue de Pera congestion is worst of all. But there a smart looking Turkish gendarme directs traffic. He spots the G.H.Q. car and has us through and thrown us a salute in the twinkling of an eye. And so to the imposing block of buildings occupied by the headquarters of the British Army of Occupation. Smart British infantry were on guard at the main entrance. More salutes, and we were at the foot of the sweep of steps leading to the door. Once inside it was like the War Office in Whitehall—endless corridors and endless doors, clerks passing up and down with baskets of files, offices for G. and Q., C.R.A., C.R.E., D.M.S., A.D.S. and T., A.D.O.S., Intelligence, Pay, Chaplains, Principal Matron. Just the British Army calmly and efficiently functioning in the Ottoman capital.

I was interviewed and told that as there was no staff billet for me at present, I should take over charge of a summer tented general hospital at a place called Mashlak some miles out of the city. This was a temporary arrangement, the O.C. was home on sick leave. I found my command was a tented hospital on barren wind-swept ground. Cooler than the city and used more as a convalescent resort than a hospital for acute cases. On my first round of inspection I found a Russian colonel sitting in pyjamas in a small single-bedded tent. I inquired about this officer. He was from Denikin's army in South Russia and had been admitted with malaria. He was now quite recovered but could not be discharged for a somewhat peculiar reason. He had arrived in pyjamas and had nothing else in the way of kit. Many letters had been written to G.H.Q. on the subject, passed to the Russian authorities representing Denikin in Constantinople; but with polite regrets the poor man had been unable either to obtain his own uniform or get any other. Strange to say he personally was quite content. He had a bed, good food, and this was a quiet life, far from Russia and ferocious Bolsheviks. Why not take it at that? After more reams of correspondence I got him a British soldier's khaki uniform, which he put on with evident reluctance and went sadly away.

I regret to say the tented hospital fell far short of my spick-and-span institution I had left at Salonika. All material, including tentage, was war worn and bedraggled. There was very much an air of remnants about it; as to the motor ambulances we used they were in the last stages of decrepitude. Also the drivers were Maltese, careless indifferent fellows, who repaired with wire or a bit of string and hoped for the best. They were mostly from Salonika and had learned that most irritating Balkan lingo which generally ended with "Finish, Johnny." You started for the city in an ambulance. Halfway there the engine failed. The Maltese got out, had a look at the engine, gave the starting handle a few ineffective turns, returned to his seat and said, "Finish, Johnny!" Visits to Constantinople were fairly frequent. Lunch or tea at the Tokatlion Hotel was a general programme and a stroll about the city or over to Stamboul to see the bazaars. I preferred the latter. Stamboul was then entirely Turkish; the bazaar was a delight with its wonderful carpets, amber, brass, and all the riches of the East. Pera was European but sordid, good shops, mostly French, but a narrow, dirty street with pot-holes in the pavements and side-walks, and a shuffling pushing multitude, filthy beggars, pariah dogs, and ladies of the old profession by the thousand. My stay at Mashlak was short and I soon took a Staff job with the Allied Corps, Turkey-in-Europe. We were separate from G.H.Q. and had offices off Pera. This Allied Corps was obviously a dying unit and was being gradually absorbed by G.H.Q. It represented the original staff and troops that had taken over Constantinople from the Turk when he laid down his arms. Our mess was in an hotel overlooking the Petits Champs Gardens, an open-air place of entertainment fashionable for night shows and dancing. My first night in

the hotel was memorable. I dined, crossed over to the Gardens and sat about until 12 o'clock, went back to my room and so to bed—but not to sleep. The Petits Champs commenced to get going about midnight, and kept going until 3 or 4 in the morning ; then the later revellers began to arrive home and the hotel was full of stamping feet and banging of doors, not to mention alcoholic merriment. But one gets used to everything. I soon dropped into the routine, though my hours were not so late as I have described above, and I could sleep through any sort of noise. The chief interest was in watching the people. No better place for that than the famous gardens. Take a seat at a little table, order your drink and use your eyes. At a near table sat a young British naval rating, he was talking to two villainous-looking Levantines of sorts. They were obviously plying him with drink. Later that evening the sailor lad came to my table and asked for help. His drinking companions had relieved him of his wallet in which he carried that night £14 of back pay. He was engaged on mine-sweeping and well paid. Of course, I could only send him to the A.P.M.

(*To be continued.*)

INTERNATIONAL CONGRESS OF MILITARY MEDICINE AND PHARMACY, THE HAGUE, 1931.

Conclusions arrived at on the various subjects discussed.

First Subject: THE RECRUITMENT, ORGANIZATION AND TRAINING OF MILITARY MEDICAL OFFICERS AND PHARMACISTS.

I. THE question of recruitment has only two solutions :—

(1) An early recruitment amongst students in medicine and pharmacy at the beginning of their educational course.

(2) A later recruitment amongst doctors and pharmacists who have obtained their diplomas.

It seems that the first system is the better means of widening the field for the selection of the best talent, before they have definitely decided on a career in civil life. The efficiency of the Medical Services depends essentially on the quality of its officers. It is therefore necessary to express the wish that Governments may offer such advantages as will attract the best candidates.

The early recruitment implies recruitment at the time of the Entrance Examination; it might be said that this examination deals with knowledge too recently acquired. This can be got over easily by including in the examination tests of general education.

II. The instruction of the military medical officer and pharmacist must naturally embrace medical or pharmaceutical science and special military subjects. To be undisputed the standard of medical knowledge must be capable of comparison. For this purpose it is essential that it should have a common source and be carried out under similar conditions. The instruction of military medical officers and pharmacists must therefore be left to the civil faculties. The military instruction should be carried out in the special schools and training colleges and be of a nature which is essentially practical.

III. It is desirable that throughout their career military medical officers and pharmacists should attend courses of instruction in both professional and military subjects.

It is obvious that pure specialization in either professional subjects or military administration is not in compliance with the highest interests of the Medical Service, of which the leading authorities must always be in a position to control all aspects of the Service.

IV. The training of officers of the reserve of the Medical Services should be carried out as far as possible by courses of instruction in the special training colleges during the whole period of their service. Their instruction should be further improved by graded training of an essentially

practical character and adapted to the duties which these officers will be expected to carry out in time of war.

V. The Congress expresses the wish that the various nations may favourably regard the proposals for an exchange of officers of the Medical Services between different countries.

Second Subject: THE PSYCHONEUROSES OF WAR: THE IMMEDIATE AND REMOTE EFFECTS OF WAR ON THE NERVOUS SYSTEM IN COMBATANTS AND NON-COMBATANTS.

I. War, especially when of long duration, undoubtedly plays an important part in the production and in the frequency of the mental disorders which become manifest during the course of hostilities. Psychopathic heredity, degenerative states, and morbid constitutional tendencies are not the sole factors in the production of mental disorders. Occasional factors are of undeniable importance, and in time of war such factors are common and their effect is considerable: Wounds, concussions, physical fatigue, mental tiredness, infections, various intoxications (alcoholism), moral shock, emotions.

The role of emotional shock is specially important in the production of psychoneuroses, which resulted in frequent occurrence during the war of post-emotional syndromes and states of mental disorientation.

II. But the war did not create psychoses of a new type with fresh symptoms and a different mode of development. No definitely new disease appeared; the relative frequency of certain morbid states was, however, modified (the frequency of confusional states, the result of great emotion—named during the war "shell shock" or post-commotional syndrome). These terms have been at times misapplied. It is important to give up the use of such terms or to limit their use to cases which have been definitely investigated.

III. The symptomatology of each war psychosis has been as a whole strictly comparable with that observed in similar cases in peace time, but the symptoms have been modified by the effects of war of which they have been a faithful reflection.

IV. The anti-social reactions resulting from the psychoneuroses of war were also of the same type as those found in peace time, but they were modified by the circumstances of war and had more serious results for the individual, for their immediate associates, and for the discipline of the Army.

V. The psychoneuroses of the war have become a responsibility of the State as regards the eligibility for pension. In the case of crimes committed by persons suffering from psychoneuropathic conditions, the medical expert called to advise on the penal responsibility should be a specialist in psychiatry. Definite opinions on such cases can only be given after a careful study of each type of case.

VI. The arrangements in the Service for dealing with the cases of psychoneuroses in war should be prepared in peace time.

This service should comprise the following :—

(*a*) A centre for nervous and mental cases for each army, situated near the main casualty clearing station and intended chiefly for the sorting out of neurotic and psychic cases, the evacuation of the serious cases and the treatment of all cases in which cure can be effected within a reasonably short time.

(*b*) Special means of evacuation as regards personnel and equipment to be placed in case of necessity at the disposal of the ordinary ambulance trains.

(*c*) A regional centre in each zone of the interior arranged in the main hospital in the principal town, with an ample specialist staff whose duties are to make a second sorting out of cases. To arrange the cases in three categories :—

- (i) Serious cases of mental disease who must be treated in special institutions.
- (ii) Acute transient cases and mild cases (such cases would be treated in the regional centre).
- (iii) Cases which are curable but requiring prolonged treatment. For this category the organization of secondary regional centres specially adapted should be considered.

VII. It is necessary in peace time to arrange for the elimination of potential mental cases by special examination boards composed of mental specialists, and for the allotment of those cases to duties which they are capable of carrying out in time of war. Such an arrangement is essential to secure suitable employment for minor mental cases and for the application of the elementary rules of mental prophylaxy. The task is more difficult in countries where military service is not compulsory.

Third Subject: METHODS OF HÆMOSTASIS ON THE BATTLE-FIELD.

I. The treatment of urgent hæmorrhage on the battle-field raises the question of the tourniquet, a means which is almost always useless and always dangerous, especially in the hands of those without medical training. However, in case the wounded man should employ some method of ligature which is still more injurious to the tissues, it is perhaps not advisable to prohibit definitely the use of the tourniquet.

II. The equipment to be allowed to non-medical personnel should include elastic bandages which do not contain rubber, compresses, and an Esmarch bandage in reserve for emergency use.

III. The instruction of stretcher-bearers, of soldiers, and of officers, should deal with the dangers of the tourniquet and the sole indication for its use, namely, arterial hæmorrhage when the blood escapes in jets.

IV. The arrest of hæmorrhage at the aid post may to a certain extent

be left to the initiative of a responsible medical officer (provisional treatment by cutaneous suture, artery forceps, or by compression; with the placing of a tourniquet in readiness over the bandage, which should only be tightened in case of need).

V. It is desirable to continue the research indicated in the Italian reports with a view to eliminate the dangers of ischæmia from the application of the tourniquet.

VI. The essential question seems to be that of instruction of subordinate personnel. The Congress expresses the hope that this instruction may be standardized in all armies.

VII. It appears desirable that an inquiry should be instituted by the Committee on the Standardization of Medical Equipment as to the best type of rubber bandage for the arrest of hæmorrhage.

Fourth Subject: THE PREPARATION AND STORAGE OF MEDICINAL AMPOULES IN USE IN THE NAVAL AND MILITARY MEDICAL SERVICES.

I. The ampoules should first of all be cleaned and sterilized. Method of sterilization: 160° C. for two hours.

II. It is recommended that freshly distilled water, or distilled water which has been kept under aseptic conditions, should be used.

III. In the case of oily liquids for injection the oil used must be neutral and sterile.

IV. The more aseptic precautions are observed during the course of preparation, the more simple and more certain will be the sterilization.

V. The best method of sterilization is sterilization in the autoclave at temperatures from 110° to 120° C. for fifteen to twenty minutes, according to the circumstances. Other methods are sterilization by current steam at a temperature of about 100° C. and fractional sterilization at 60° to 70° C. on three successive days. In the aseptic preparation of liquids for injection it is most important to observe rigorously the precautions indicated above.

VI. The use of filter-candles always necessitates a bacteriological control of the finished product.

VII. To ensure that medicinal ampoules keep well in storage it is essential to employ neutral glass, the preparation of which has been strictly controlled.

VIII. In principle it is advisable to renew stocks as frequently as possible.

Fifth Subject: THE AFTER-EFFECTS OF WOUNDS INVOLVING THE TEETH AND LOWER JAW, AND THEIR TREATMENT.

I. The prevention of after-effects of wounds of the lower jaw involving the teeth depends to a large extent on early treatment.

II. The treatment of these wounds necessitates from the beginning close co-operation between the dental officer and the surgeon. This

co-operation has been recognized in certain countries and a facio-maxillary team has been formed.

III. The infection of bony fragments is particularly to be feared. It is kept up by the presence of a foreign body or of tissue acting as such: bone, sequestrum, or tooth. The treatment consists in eliminating the sources of infection.

IV. Pseudo-arthrosis cases in which there is definite loss of tissue that cannot be cured by special appliances, come under the domain of surgery (bone grafting; metallic osteo-synthesis should be avoided).

V. Cases of vicious callus justify osteotomy either with or without bone grafting, in addition to an apparatus for immobilization in good position.

VI. Secondary effects on the teeth, necrosis from neuro-vascular rupture, destruction of the alveolus, loss of dental apposition, loss of teeth, should be treated as soon as possible.

VII. Temporo-maxillary bony ankylosis should be treated by arthrotomy and appliances to ensure free movement.

VIII. Vicious cicatrices and destruction of soft parts belong to the domain of plastic surgery.

IX. Secondary neuritis should be treated by the methods in common use for neuritis.

X. In cases of wounds of the face, one must never lose sight of the effect of these wounds on both the general and psychological state of the individual.

XI. The experience of the last war has shown the urgent necessity of arranging instruction in time of peace of a sufficient number of specialists to ensure the adequate treatment of facio-maxillary wounds in all areas.

Editorial.

THE HEALTH OF THE ARMY.

We have just received the report on the Health of the Army for the year 1930, submitted by the Director-General, Army Medical Services, to the Under-Secretary of State, War Office, on October 18, 1931.

The Director-General states in his introductory letter that the health of the troops both at home and abroad has maintained a high level during the year under review, the incidence of sickness being only 2·2 per 1,000 of strength above that for 1928, which was the healthiest year since the Great War. This happy state of affairs may be partly attributed to the comparative freedom from influenza during the year.

The admission ratio for soldiers was 428·4 per 1,000 of strength compared with 468·5 in 1929, and 426·2 in 1928. The principal causes of admission to hospital were: malaria, venereal diseases, inflammation of tonsils, inflammation of areolar tissue, sandfly fever, inflammation of bronchi and local injuries. The principal diseases which show an increase in the admission ratio per 1,000 of strength compared with the previous year are sandfly fever, dysentery and syphilis. Influenza shows a decrease of 28 per 1,000, inflammation of tonsils 7 per 1,000, and gonorrhœa 1·5 per 1,000.

There were 414 deaths, or 2·32 per 1,000 of strength, compared with 2·45 per 1,000 in 1929, and 2·36 in 1928. The commands with the highest ratio of inefficiency were: Aden, China, Jamaica and Ceylon; while those with the lowest ratio were Malta, Bermuda and Mauritius.

The number of invalids discharged from the Army was 1,665, or 9·28 per 1,000 of strength, compared with 10·10 in 1929, and 9·06 in 1928. The principal causes of invaliding were tuberculosis, mainly pulmonary, and diseases of the middle ear. Compared with the previous year, suppurative inflammation of the middle ear shows a fall from 178 in 1929 to 133 in 1930, and ordinary inflammation of the ear from 82 to 49. This marked improvement in the figures is stated to be partly due to improved methods of examination of recruits. Medical examiners of recruits are now supplied with electric auriscopes, and many recruits are rejected who would have been passed fit under the older method of examination, which did not secure adequate illumination of the ear-drum. There is now also insistence on greater care being exercised by medical officers in the examination of ears and on the early detection of acute cases of aural disease, with a consequent improvement in the results of treatment.

The principal causes of inefficiency on account of sickness in hospital were: gonorrhœa, malaria, inflammation of areolar tissue, fractures, inflammation of bronchi and tonsils. The average number constantly sick in hospital for gonorrhœa was 639.

The average sick time to each soldier was 8·8 days, and the average duration of each case of sickness 20·53; the corresponding figures in 1929

were 9·53 and 20·35. The average daily number of soldiers treated as out-patients was 2,524·92, or 14·12 per 1,000.

The combined ratio of constantly sick in hospital and under treatment as out-patients was 38·25 per 1,000 of strength.

We have constantly drawn attention to the number of working days lost from the more common diseases, such as diseases of the digestive system, tonsillitis, diseases of areolar tissue, venereal disease, influenza, and diseases of the bronchi. These with local injuries caused a loss of more than 372,000 working days in 1930. Only 10,000 working days were lost from influenza in 1930, compared with nearly 62,000 in 1929.

In India 170,000 working days were lost from venereal diseases, local injuries, diseases of the digestive system, tonsillitis, and sandfly fever.

The admission ratio for diphtheria in the various commands at home and abroad varies little. The ratio per 1,000 was 1·4 in 1930 and 1·2 in 1929, and also 1·2 for the quinquennium. There was a small outbreak among the boys in the Army Technical School, Beachley. Schick tests were made on 243 boys; 52 were found to be positive and 48 were immunized. In India there was an increase in the number of admissions for diphtheria. A small outbreak occurred at Kohat, attributed to an Indian servant acting as a carrier. Attention is drawn to the mildness of the disease in India, and the importance of early administration of anti-diphtheritic serum in doubtful cases is stressed. Cases of post-diphtheritic paralysis occurred without any marked throat symptoms. Indeed, one case denied having suffered from sore throat at all. The man belonged to a unit in which there had been a number of diphtheria cases about the same time.

The admissions for dysentery at home and abroad, excluding India, increased from 1,167 (ratio per 1,000 6·5) in 1929, to 1,360 (7·6 per 1,000) in 1930. The higher admission ratio is stated to be due mainly to improved diagnostic methods. In India, since 1924, there has been a slight rise in the incidence of dysentery and diarrhœa, and a drop in that of colitis. The increased incidence is mainly due to the inclusion in the dysentery group of mild cases formerly diagnosed diarrhœa. Experience has shown that many diarrhœa cases in India are really infections with *B. dysenteriæ* (Flexner) or *B. dysenteriæ* (Shiga). The importance of reporting sick early in an attack of diarrhœa is constantly being impressed on the troops. Cases with a bacillary exudate are now placed in a special group, and clinical cases now include those cases in which neither *E. histolytica* nor typical exudates have been found and dysentery bacilli have not been isolated. Of the 1,264 cases of dysentery among British troops in India, 64·8 per cent were bacillary in origin, 14·6 per cent protozoal, and 20·6 per cent clinical.

Most of the cases caused by *B. dysenteriæ* (Flexner) are mild, but occasionally severe cases are met with, especially amongst children. In one or two stations, *B. dysenteriæ* (Shiga) is the main cause of dysentery. Polyvalent antidysenteric serum has been useful in treating severe cases

of both infections. *B. dysenteriæ* (Flexner), type *w*, appears to be the commonest strain in India, although the other strains of Andrewes and Inman also occur. Certain strains, however, found in India, appear to be distinct from those described by Andrewes and Inman.

The incidence of amœbic dysentery has not varied much during the past five years. In Quetta there was an increase in the number of cases in the months when flies were prevalent. Out of 433 cases of amœbic dysentery which had completed the first course of emetine treatment, *E. histolytica* cysts were found in 152.

True amœbic hepatitis shows a decline on the previous year's figures. It is notable that 71·4 per cent. of the cases had not suffered from dysentery or diarrhœa prior to the onset of hepatitis. Treatment with emetine seems to have abolished hepatic abscess in cases of frank amœbic dysentery.

There was a slight decrease in the number of admissions for typhoid fever during the year. They amounted to 253. The ratio per 1,000 was 1·4, while that for the quinquennium was 1·2. This does not mean an actual increase in the incidence of the disease, but is due to the recognition of the abortive forms of enteric characterized by perhaps only three or four days of pyrexia.

There were 7 admissions in home commands, 30 in Egypt, and 207 in India. Of the total number, typhoid fever accounted for 86 admissions, paratyphoid fever for 50, while 117 were returned as enteric group. In India there has been a diminution in the admissions for typhoid fever and the "enteric group," both among British and Indian troops. This, it is thought, may be the result of the re-inoculation of the troops with two doses, half and one cubic centimetre of T.A.B. vaccine, instead of one dose of one cubic centimetre as in former years. Whether the fall in the admissions in 1930 is due to the re-inoculation can only be proved by further experience. For a few years there has been a steady increase in the number of cases of typhoid fever among Indian troops due to better diagnosis.

The importance of a thorough laboratory investigation of cases of mild pyrexia is constantly brought to the notice of all medical officers. During 1930 the military laboratories in India received 5,186 blood-cultures from suspicious cases of enteric fever, and positive results were obtained in 412 cases. It is now laid down that a blood-culture should be taken within forty-eight hours from every case of pyrexia without obvious cause. A case of typhoid fever is reported as having suffered only from pyrexia for thirty-six hours, and no other symptoms. Yet *B. typhosus* was isolated from his blood.

Over ninety per cent of the British cases and eighty-six per cent of the Indian cases were diagnosed by blood-culture. In ten British and eight Indian cases a second blood-culture proved positive, when the first had proved negative. Workers in military laboratories now appreciate the fact that it is necessary to incubate blood-cultures for several days

before giving a negative report. In one case a growth was not obtained until the eighth day of incubation.

The number of paratyphoid A cases diagnosed by bacteriological examination increases year by year. The Widal tests performed during the past two years on ten enteric group cases seem to indicate that 20 per cent of the cases in this group are paratyphoid A infections.

The inoculation statistics of British troops in India show that 92·7 per cent of the officers and 97·8 per cent of other ranks are protected. In the protected group, there were 3·36 cases per 1,000 and 0·23 deaths per 1,000; in the unprotected group, there were 20·99 cases per 1,000 and 1·68 deaths per 1,000.

There was no reduction in the incidence of malaria in 1930. The admissions for the whole army were 7,365, a ratio of 41·3 per 1,000 as compared with 41·2 for 1929 and 46·5 for the quinquennium. Of the total admissions, 6,564 occurred in India, 334 in China, and 248 in Egypt and Palestine.

In the Hong Kong area, there was a reduction in the admissions from 99 per 1,000 in 1929 to 35·7 per 1,000 in 1930. This reduction is attributed to drainage in the swampy area close to the barracks at Lyemun and to modern oiling methods employed in the streams surrounding the camps where troops are located for five months of the year.

In the Shanghai area, the incidence increased from 26·9 per 1,000 in 1929 to 77·2 per 1,000 in 1930. The troops live in hutted camps surrounded by Chinese-owned land with sluggish streams, ditches and swamps swarming with mosquitoes. The efforts of the municipal authorities have been thwarted by the objections of the Chinese to the use of Paris green and the oiling of streams.

In India, the increase in the incidence of malaria from 116 to 118·4 per 1,000 is comparatively small taking into consideration the greater number of troops which had to be maintained in the plains, the movement of troops from the hills during the malaria season and the employment of troops in small columns when anti-malaria measures were extremely difficult to carry out. The increase in the incidence was chiefly in the Northern and Eastern Commands, the areas mainly involved in the troubles connected with the disobedience movement. In the Northern Command, ten grains of quinine were issued daily to the troops, during September and October, as a prophylactic measure. In Peshawar, Nowshera, Kohat, Risalpur and Rawalpindi the incidence of malaria was less than in 1929, in spite of the adverse conditions. But as there was a partial failure of the rains in these stations this, rather than the quinine, may have led to the decrease in malaria.

The trials with plasmoquine 0·04 gram and quinine 20 grains daily made during 1929, having shown that this treatment gave satisfactory results in preventing relapses, trials with 0·03 gram of plasmoquine and 20 grains of quinine daily are being made at an anti-malaria treatment

centre. The results so far obtained indicate that the number of relapses is about the same as with the larger dose of plasmoquine, and that symptoms of toxæmia are negligible.

The usual anti-malaria measures are being continued. Barracks at Jubbulpore are now being mosquito-proofed, and permanent drainage works are being carried out in many stations, notably at Rawalpindi.

In many stations there has been difficulty in carrying out anti-malaria measures, owing to the dual control and consequent lack of liaison between cantonment and municipal areas. The Government of India has invited all municipal authorities to co-operate with cantonment authorities in the formation of combined anti-malaria committees.

Under the heading of pyrexia of uncertain origin 164 cases of unidentified fever were returned; 18 occurred at home and 115 in India. The Report states, "It seems incredible that in all India there were only 115 cases of fever where the diagnosis was not established beyond doubt, and probably a number of the admissions under such headings as intestinal toxæmia, headache and myalgia ought probably to have been included in addition. Of late years there has been an unwillingness in certain quarters to accept a diagnosis of pyrexia of uncertain origin, a short-sighted attitude that darkens counsel and hampers the recognition and grouping of tropical fevers of unknown ætiology." When every means has been used to determine the nature of a fever, it is much better, in case of doubt, to use the term pyrexia of uncertain origin than to employ such vague terms as headache, toxæmia, etc.

There was a slight increase in the incidence of sandfly fever, mainly due to the employment of "unsalted" regiments in the North West Frontier Province and in the Punjab. There were 708 more admissions in the Peshawar district than in the previous year. As a result of the civil disturbances, an increased number of troops was moved into the district, and owing to the nature of their duties were more exposed to infection than in former years. The British regiments employed had received heavy drafts from the United Kingdom, and in these only partially "salted" units the admission ratio varied from 236 to 450 per 1,000. The Indian regiments employed had a high degree of immunity, and an average ratio of only 30 per 1,000. The 1/3rd Gurkha Rifles, an "unsalted" regiment, arrived in the district in May and had an admission ratio of 479 per 1,000.

The admissions for pulmonary tuberculosis numbered 176, a ratio of 1 per 1,000. The ratio for 1929 and for the five-year period was 1·2 per 1,000.

An analysis of the incidence of tuberculosis, according to branch of the Service, age-group and duration of service of those affected, has been completed for 1930. The most significant figure is the incidence in the Household Cavalry, viz., 4·8 per 1,000, compared with 1·5 for the Foot Guards and 0·8 for the Infantry.

Thirty years ago, Dr. Parkes drew attention to the high incidence of pulmonary disease in the Foot Guards and Household Cavalry. He considered that there was only one condition which would explain it, and that was overcrowding. The breathing of the foul barrack atmosphere was the principal, and perhaps the only, cause of the great mortality from lung diseases. There has been great improvement in the housing of the Guards and especially of the Household Cavalry, and overcrowding can hardly be the cause of the marked incidence at the present time. It is to be noted that the numbers in the Household Cavalry are small, and very few cases of tuberculosis would naturally give a high ratio per 1,000. Still, we think that other possible causes should be investigated. It may be that the barrack rooms are not sufficiently ventilated at night, and that excessive guard duties have some influence. The ratio amongst the various Corps, such as the Veterinary, Dental, Pay, Military Police, is also high, viz., 3·7 per 1,000. Here again the numbers at risk are small.

There was a slight decrease in the number of admissions for venereal disease in 1930, mainly due to fewer cases of gonorrhœa.

The incidence of venereal disease is very high in the China Command, 195 per 1,000; in Jamaica it is 125·8 per 1,000; in Malaya, 87 per 1,000; and in Gibraltar, 50 per 1,000.

The admissions for dengue recorded in 1930 show a great increase, viz., 822 per 1,000 compared with 452 per 1,000 in 1929. The former figure is supposed to give a truer idea of the real incidence of dengue which is notoriously difficult to diagnose and often returned as sandfly fever, influenza or P.U.O. Experimental work on dengue has shown that many of the successful infections are extremely mild, do not show any of the classical symptoms and yet are capable of infecting mosquitoes. In India it is considered that many of the cases returned as sandfly fever are really dengue; an opinion which is supported by the high re-infection rate for sandfly fever recorded in some Indian stations.

In Jamaica the admissions included 140, which in former years would have been returned as P.U.O. Bush clearing carried out after the November and December rains was found to be followed by a considerable reduction in cases until the following May.

In the Report for 1929 there was a brief account of human cysticercosis in which was stressed the importance of considering this condition as a possible cause of epilepsy commencing during or after service in the tropics. Two other cases of epilepsy due to cysticercosis were admitted to Queen Alexandra Military Hospital, Millbank, in 1930. The following interesting points in these cases are noted in the special section of the Report devoted to Medicine. The presence in both cases of palpable subcutaneous cysts; the latent period of four years in Case II, before the fits commenced; the failure to demonstrate intracranial cysts in Case I by X-rays although cysts were shown in large numbers throughout the

body; the positive reaction to antigen in Case I when the cysts were extensively calcified, the absence of definite eosinophilia in Case II while undegenerated larvæ were still demonstrable.

In these cases of epilepsy it is evident that a careful search for subcutaneous cysts should be made and an examination of X-ray films for the characteristic appearance of calcified cysts in the tissues. When possible, complement-fixation and intradermal tests with *Tænia* antigen should be carried out.

During the summer months trials were carried out in Egypt with an experimental marquee. The ventilation was stated to be excellent and although the temperature inside was little different from that in an ordinary hospital marquee, the occupants stated that the new pattern felt cooler. It admitted more daylight while giving sufficient protection from the sun. It also provided more space for the movements of the personnel and for the accommodation of equipment and also gave sufficient space for the hanging of mosquito nets.

A modified 160 pounds Indian pattern tent was not found suitable for Egypt.

In view of the high temperature of certain wards in the upper floor of the British military hospital at Khartoum during the summer months, the Government geologist carried out a series of experiments on the temperatures reached under certain roofing materials. These experiments seemed to show that the coolest atmosphere was obtained under roofs painted white irrespective of the material used.

Work on a new water purification plant has been completed. Satisfactory results have been obtained in the production of chloramine from electrolytic sodium hypochlorite and ammonium salts and this method of chlorination is being used in the new plant. Clarification is obtained by two aluminium press cloth filters, and 1,200 gallons of water can be pumped, filtered and sterilized in an hour. The whole plant will fit on a thirty-hundredweight six-wheeled lorry and will raise water from eight feet below its level to a height of twenty feet.

It is stated that during the 1st Divisional Exercises on Salisbury Plain satisfactory sterilization of water was obtained by the water sterilization powder and by means of the Harold mono-chloramine technique. It was observed that when water was treated in bulk with the chloramine process demonstrable chlorine fraction could be shown to be present many hours longer than when the sterilizing powder was used.

A new field disinfector forming a mule pack load has been tested and found eminently satisfactory. It is to be subjected to "rough usage" and "fair wear and tear trials" on manœuvres.

We are glad to see that suggestions are being made for a new pattern service dress. The jacket is to have a turned down collar open at the neck in front; a drab angora shirt (of tennis shirt pattern) is to be worn with a tie. Trousers are to be in the nature of "plus-fours" with gaiters of either soft leather or canvas.

Clinical and other Notes.

AN UNUSUAL CASE OF DERMATITIS.

By Lieutenant-Colonel R. F. O'T. DICKINSON, O.B.E.,
Royal Army Medical Corps.

The following case is thought to be worthy of record owing to the large extent of skin involved and to the apparent hypersensitiveness of the patient to turpentine absorbed through a skin of fine texture.

Staff Serjeant-Major X, of the Royal Army Service Corps, reported sick on August 9, 1931, with an urticarial dermatitis of the left knee and upper half of left calf and lower third of left thigh. There was no fever or constitutional disturbance. The urine showed a trace of albumin and had a faintly aromatic odour.

He stated that he had twisted his left knee slightly and had been rubbing in turpentine liniment for five or six days. The appearance of the rash had alarmed him and he had consequently reported sick.

Lotio calamini was applied to the rash and saline aperients were administered.

On August 12 there was no improvement in the rash, so applications of 2 per cent ichthyol in glycerine were tried. The raised red wheals had extended to the left buttock, with a few spots on the left side of the neck. A few similar patches had made their appearance on the right shin and calf.

On August 14 the patient was admitted to hospital. The skin of the left thigh, calf and knee was swollen and œdematous, and a few small blisters had appeared over the region of the left knee. The rash extended over the right calf and lower third of the right thigh and began to appear on the sides of the chest and back. There was slight puffiness of the eyelids. The patient was sponged down frequently with alkaline lotion, and a very weak picric acid in spirit lotion (0·5 per cent) was applied over the blistered area on the left knee and leg. Calcium lactate was given internally. Light milk diet, salines and rest in bed were ordered. The urine was normal. There was no lung œdema.

On August 15 a spirit lotion was applied to the rash where most marked on both lower limbs. The rest of the body was sponged down with alkaline lotion several times daily. Salines and calcium lactate were continued.

On August 16 the rash was more prominent on the right leg and thigh and appeared in large coalescing œdematous patches. Continued spirit dressings were applied. The rash on the left side was fading and a scaliness was taking its place. The œdema of the eyelids was nearly gone.

On August 20 the dermatitis on the right side had disappeared, a slight scaliness of the skin remaining.

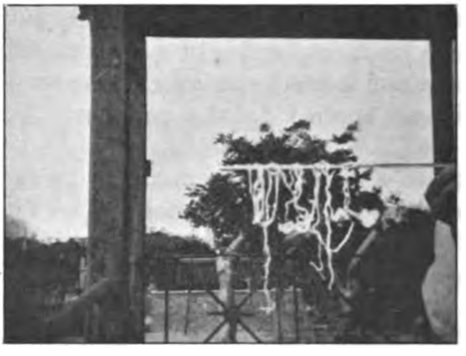
The patient was quite well and marked for discharge from hospital on the following day.

CASES OF DRACUNCULUS MEDINENSIS.

By Captain K. B. GORE,
Indian Medical Service.

Eleven cases of guinea-worm were treated at the Indian Military Hospital, Kowloon, during the months May, June, July and September, 1931. Ten cases had multiple infestation, and from one of them no fewer than eight worms were removed.

The source of infestation in all cases was Hissar District, India. An average of ten months elapsed between the infestation with the embryos and the appearance of the adult female worms.



The following account presents the history of an interesting case. Sepoy N. L., 3/9th Jat Regiment, aged 30, service ten years, village Sadhain, District Hissar. The village has 200 houses with 1,500 population. There are two wells used for drinking purposes, one of which has a staircase leading to the water level. In this village about ten persons were suffering from guineaworm when the Sepoy went home on six months' furlough. He left home on September 26, 1930, and arrived at Hong Kong on November 10. On July 6, 1931, while on guard duty during heavy rains, he felt slight itchiness all over the body and a burning sensation localized to a spot on the posterior aspect of the upper third of the right leg. A few hours later a blister appeared, together with urticaria of the body. The blister burst on the third day and the first worm appeared. At intervals of ten to fifteen days blisters appeared, without urticaria, in the following order: The second worm appeared below the anterior third of the right iliac crest. The third worm on the inner aspect of the left knee. The

fourth worm on the outer side and dorsum of the left great toe. It had coiled around the toe, passed through the plantar arch, below the internal malleolus, and had hooked half way down the leg. The worm could not be felt, but the patient could trace its course. The fifth worm appeared in the middle of the right gluteal region. The sixth worm in the upper half of the posterior aspect of the left thigh. The seventh worm two inches below and on the inner aspect of the left knee. The eighth worm through the same opening as the sixth while the patient was taking a bath; the patient himself removed the worm with ease.

The length of these worms varied from eight to twenty inches. The patient felt general weakness and pain in both lower limbs after discharge from hospital.

The treatment consisted in douching and immersing the affected part in cold water, and injection of two per cent cocaine solution into the worm and gentle and gradual traction. Five worms were removed whole and three were broken during extraction. Cellulitis and abscess formation developed on the latter occasions.

My thanks are due to Lieutenant-Colonel H. P. Hart, M.C., R.A.M.C., Officer Commanding, Indian Military Hospital, Kowloon, for allowing me to publish this note.

MASKED MIDWIFERY.

By Colonel E. L. MOSS, C.M.G., M.C., M.C.O.G.

About fifteen hundred women die annually in the British Isles from puerperal sepsis. Twenty times this number suffer but recover from varying degrees of septic infection. A large majority of the more serious cases are due to the hæmolytic streptococcus, which is found in the nose and throat of attendants quite commonly. In spite of this knowledge, the majority of confinements and vaginal examinations are conducted by unmasked attendants. Masks are, of course, worn by the doctors and nurses in all the more modern obstetric units and by the more enlightened practitioners.

A few extracts from the very interesting and thorough reports by Watson and Meleney, published in the *American Journal of Obstetrics and Gynecology*, 1928, on an outbreak of puerperal sepsis at the Sloane Hospital, New York, will serve to illustrate the above remarks.

In January and February, 1927, out of the 163 patients confined in this very modernly-equipped hospital, twenty-four developed streptococcal infection and nine died. Thirteen of the deliveries were normal and in seven no examinations were made; six were forceps cases, four Cæsarean sections, and one case of twins with internal version.

Complete bacteriological investigations were carried out. No streptococci could be recovered from the water, walls, air, dressings, sheets in the

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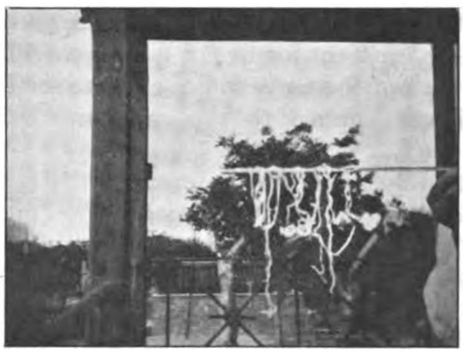

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Complete bacteriological investigations were carried out. No streptococci could be recovered from the water, walls, air, dressings, sheets in the

cupboards, or from the blankets, etc., but twenty nurses and two surgeons had hæmolytic streptococci in their noses and throats. In the serological study of the strains isolated, one nurse had in her nose a strain that was identical with the organism that was recovered from several of the cases, as proved by reciprocal cross absorption and agglutinin tests. Prior to the outbreak masks had been worn, but with the noses uncovered. Masks were not worn for antepartum examinations, nor were they used by the postpartum and puerperium nurses when changing pads, etc. As a result of the investigation, it was recommended that efficient and complete masking of all attendants must be carried out, and that surgeons and nurses should be subjected to weekly swabs from nose and throat.

Recently, when performing a Cæsarean section in a very modern operating theatre, I happened to notice myriads of those minute particles of dust floating about, up and down in the air over the instrument table, clearly visible in the strong beam of light that was being thrown in that direction, just as one sees them in a beam of sunlight. One could see them being propelled away in front of the sister's mask when she spoke. As with ordinary lighting we practically never see them, we forget that the air is loaded with these dust particles, and it is worth while demonstrating this to the nurses by means of a very strong beam of light in a dark part of the theatre. Very little imagination is required to picture the millions of streptococci riding about on these particles as the result of spray infection from the noses and throats of the unmasked. No unmasked person should be allowed in any theatre or labour ward. There are reasons why it is not so necessary to mask the woman in labour herself. Sterile gloves may be infected by spray or droplets from the unmasked, especially if much talking is going on. Picture the usual position of the doctor at the moment of the birth of the child or in repairing the torn perineum. The doctor's face is close to the perineum and he frequently talks to the nurse or anæsthetist. If the doctor is unmasked and harbours streptococci it is a matter of luck if the woman escapes. It is always being pointed out to us that, in spite of modern antiseptic principles, the improvement in childbirth mortality that should correspond to the improvement in surgical results does not occur. If the personnel of the operating theatre talked and coughed unmasked, should we not see more wounds "going wrong"? I believe that when efficient masks are worn by those conducting vaginal examinations before labour and during and after the confinement, we shall see a marked drop in the sepsis rate, which is the principal cause of death in childbirth.

The R.A.M.C. confine 2,600 women annually, Rotunda 3,800, Queen Charlotte's 2,500. If the three biggest family hospitals would adopt different techniques and compare results after three years it would be interesting. The statistics of the Army obstetrical service, composed of small units for the comparison, could be made very interesting.

Echoes of the Past.

RECOLLECTIONS OF NETLEY AND ALDERSHOT IN 1887.

By Colonel E. C. FREEMAN, C.M.G.

Sitting next to the Director-General lately at a City Dinner, the great man suggested that I, being a veteran, might have some reminiscences which would interest the readers of the Journal of the Royal Army Medical Corps, to which I used to have the honour of contributing occasionally in the past.

I fear that my tales, seen in the cold light of day, will prove dull in the extreme, but they may give some idea of past conditions of medical service in the Army, so that must be my excuse for what follows.

First came the Competitive Entrance Examination which was common to Army, Navy and Indian Services, and which always struck me as being the *beau ideal* of what such an examination should be—with operations on the dead body besides the written and oral examination of the usual kind—and it also included a case culled from a medical journal for commentary, which gave an opening for a brief medical essay. Whatever the standard adopted, the whole thing was exceedingly well planned and conducted. Competition ran high for the Indian Medical Service in those days, and the Naval Medical Service was a bad third, some men who failed for the Army being admitted to the Naval Service, including one of our party who, having an M.B degree, loudly declaimed against having to pass any further examination at all.

This over, I joined in the early spring at Netley, whose towers and domes form so picturesque an object from Southampton Water. Now I fear it is a desert, but then it was in its hey-day of prosperity.

All the invalids from abroad, except Royal Engineers and Royal Artillery, filled its wards, and the really fine rooms of the Mess Block were lively with festivity and military mirth.

We were called Surgeons on Probation and had to equip ourselves with a good deal of uniform, and in this we had to parade and be meticulously inspected until every item was absolutely correct. The Army Medical Service in those days was very "dressy," boasting the prettiest patrol jacket in the Army, with dependent mohair braid across the front and a "false collar" of red and gold, and overalls with red stripes tightly strapped over Wellington boots. All extremely nice, but hardly suitable for the hospital wards. This was recognized by the authorities, and as an enormous concession a blue jumper was allowed to be worn, but only in the wards. It was understood that if seen outside in such a garment, one would be immediately cashiered! We had beautiful greatcoats with broad velvet

collars; in later days I had mine lined with red flannel instead of the original Italian cloth, making it a warmer and lighter garment, and no one was any the wiser. Peaked caps, also with much gold lace, completed the turn-out.

The mess kit, too, in blue with black velvet and a red waistcoat buttoning up to the neck (almost exactly like that of the Royal Artillery) was distinctly imposing but not comfortable, especially when as orderly officer one had to wear it at mess with the jacket also buttoned up, and a cross belt over all. In those days many medical officers still wore their old regimental uniforms, and in scarlet tunics with cocked hat and feathers looked very smart, and were always mistaken for Generals.

Much later in India I came across a senior medical officer who was so bigoted that he refused to have Medical Staff uniform, so that on rare occasions when he attended a General's parade we rigged him out among ourselves with the various articles in which he was deficient.

Khaki was worn in India and should have been a cheap and serviceable dress, but to counteract this happy result it was everlastingly being altered by the authorities until the proper kit of one day became incorrect in a week's time.

This, however, is taking us far from Netley, where the professors were enthroned. These were our *Dii Majores*, because our future depended very much on the view they took of us. Sir Thomas Longmore, a splendid military figure, took surgery, ophthalmology and examination of recruits; he also was an authority on ambulance work.

Then came Professor Aitken, who was very Scotch and had written a wondrous tome on Medicine, in which he had recorded the opinion of every doctor since Galen and Celsus on every possible disease. He startled his audience in his first lecture on Pathology with the astounding statement that "Many of you no doubt have never seen a microscope." Venerable instruments were then supplied us, with which we cut sections of a "carrot" and measured them on the micrometer scale. Some years later I used to run over to Netley from Gosport to do some work, and found Sir Almroth Wright in charge of the laboratory and a very changed atmosphere.

The lecturer on Tropical Medicine was I think a Surgeon-General of the Indian Medical Service. He told us all sorts of stories of his adventures in the Terai, including the cure of a cholera stricken coolie by the prompt administration of a bottle of Tobacco sauce! One other thing I remember, he implored us with whatever authority his position gave to treat cholera with calomel, and I believe he was right, but when the opportunity came to me to try it, my Principal Medical Officer, who was not great at therapeutics, strictly forbade me, saying such treatment would be simply manslaughter. He preferred to give the cases ginger beer and to let them "die comfortably." For myself, I never had another opportunity.

Finally, the Professor of Hygiene, Dr. de Chaumont, was ill, dying I think, and his place was taken by a Deputy Surgeon-General who gave us

very good practical lectures on Military Sanitation, Parkes' great work being our textbook. Captain Davies, later himself Professor of Hygiene, helped us in the laboratory work, which was far in advance of the other departments.

The professors were very great men, but they dated from Fort Pitt and the Crimean War. Every year a portrait, full length, of one of them in turn was decreed to decorate the mess room or anteroom, and all the S.O.P.'s in training were invited to subscribe.

No doubt from the purely scientific point of view the teaching at Millbank is 100 per cent better than at Netley, but I have always regretted the transfer so far as the S.O.P.'s are concerned. It would have been perfectly easy to import up-to-date teaching methods to Netley, which is not so remote from London after all, while there was an opportunity of instilling discipline and military habits which the newly-fledged medico badly needed. Also Netley took him right away from his medical school surroundings and initiated him into the etiquette of Army life amid very uplifting associations and traditions.

The life was a very pleasant one, beginning with an hour's physical and company drill before breakfast, and then work and lectures till 2 p.m., when you went into lunch with a most excellent appetite and the knowledge that work, apart from private reading, was over for the day.

There were some tea parties and tennis with the families of the various dignitaries, and cricket, but I confess that the New Forest and Southampton Water claimed all my affection, and I spent my spare time walking, boating and sketching in that delightful region, which was much more rural then than it is now.

The annual match with our contemporaries at Haslar was a very great event, the teams being entertained alternately at the respective messes. Conviviality was much to the fore on these occasions, and our eleven was picked out with an eye to hardheadedness at the table, as well as to prowess in the field. It was considered of the greatest importance that the visiting team should be sent home as "full up" as possible.

Although Netley suggests warmth, it is bitterly cold in the spring when the east winds sweep with violence across the parade ground and nearly blow you away. But the architect, to present a gorgeous façade towards Southampton Water, built all the wards at the back facing due north, where they never got any sun at all. Later this arrangement was recognized as defective, and the story ran that the Government tried to sell the building to Bryant and May for a match factory, but that they said it was not strong enough to take their machinery.

The principal entrance led into a museum of Natural History, including among other items the skeleton of the Duke of Wellington's charger "Copenhagen." This of course was irresistible to our practical jokers, and the old horse performed many nocturnal journeys and turned up in many unsuspected places.

The Indian cadets were also lodged in the central block, and many fierce pillow fights took place between them and the rest, until a Sikh was impelled by his fighting blood to defend his quarters at the point of the knife, after which further conflicts were forbidden.

There were younger officers, assistant professors and company officers, with whom we came much in contact and liked immensely, and some very senior ones—a P.M.O., M.O.'s of Divisions and so forth—of whom we saw very little indeed. The Netley chaplain had just written 'How to be Happy though Married," a book which leapt into immediate popularity, though it would seem very tame to modern readers. He and his excellent wife, it must be said, were tireless match-makers, and if they had their way would have married, or at least engaged, every S.O.P. in the batch to some suitable lady.

The final examination was of great importance, as the total entrance and exit marks settled our position on the roster.

The first Jubilee came along during our term, and a vision of leave arose to which all the professors were agreeable except the tropical medicine man (who was extremely fond of hearing his own voice), and in order that there should be no waste of our precious time, he offered himself to relieve the other professors and deliver three successive lectures on the Jubilee Day! In face of this burning zeal the project was dropped, but I seem to remember a very lively night at the mess afterwards.

Discipline was strict in some ways—the worst "telling off" I ever received during my service was from a very smart officer, Brigade Surgeon Godwin, because in a moment of haste I profaned the Surgical Division by appearing in laced boots instead of changing into Wellingtons. We were also instructed in mess routine and the use of the "Complaint Book," but when I objected in most official language to the presence of a large fat green caterpillar in the salad at lunch, I got no sympathy at all!

We had our confirmed practical joker, who instigated most of our little troubles but was never brought to book. He drove the chaplain nearly mad (being an accomplished ventriloquist) by exactly imitating his wife's voice with most endearing messages, and copied the high-pitched voice of the very irascible chief instructor at Aldershot, until the latter wasted much time in hunting for "that sanguinary parrot," whom he was never destined to catch. However, our man of humour made but a brief stay in the Service. The tale was that a gallop with drawn sword with the cavalry past the Duke of Cambridge at a Shorncliffe review ended his military career.

Altogether the Netley course was a very happy time, and we left with three aphorisms fairly implanted in our minds by the professors. First, a commission in the Army Medical Staff was the highest prize the world offered, as you were then provided for for life by pay and pension; secondly, that you must remember that an omniscient cherub was installed at Victoria Street (to which Headquarters had just removed from Craig's

Court) who would record any and every dereliction from duty and score it up against you till the date for promotion arrived; and thirdly, that it was most desirable to keep a month's pay in the bank to meet emergencies, a counsel of perfection! Also personally, I acquired a great interest in hygiene, which has remained with me all my life.

On leaving Netley we parted with our Indian *confrères*, and proceeded to Aldershot as a foretaste of the rigours of active service. Aldershot was very primitive in those days, and the A.M.S. mess consisted of two Crimean huts side by side with a glass roof between them. We were under canvas nearby, and the first morning I tumbled hurriedly out of bed thinking the end of the world had arrived, but it was merely the firing of the morning gun which was just above my tent. One quickly gets used to things, and in a very few days it failed to wake me up. The great feature at Aldershot was the riding. We were divided into squads and handed over to the tender mercies of the regimental and departmental riding masters, who proceeded to put us through a concentrated course of equitation. My squad was attached to the 5th Lancers, and most mornings we did our ride before breakfast. There was great competition between the different riding masters and we were spared nothing. We sat and bumped, we rode without stirrups and without reins, we did all sorts of fancy manœuvres, and finally took high jumps with drawn swords, and careered over the garrison racecourse. This we enjoyed very much, but the other work was less exciting. Old stagers must remember the ancient Serjeant Instructor, who showed us an ambulance waggon and recited all its little peculiarities, weight and measurements, which we had to write down carefully in our notebooks. Then his hefty assistants pulled it to pieces and put it together again, as if it were a conjuring trick, and the instructor announced, "This pattern is 'hobsolete,' and you will never see it again."

There was company drill, stretcher drill, first aid, tent pitching, the which came easy to me after seven years in the Artist Rifles, and that is all I remember.

The residents all hated us except Major Le Mottee, as he then was, who, reflecting that our presence there was quite involuntary, took pity on us and helped us in every way he could. As a result of this want of cordiality we all applied for stations other than Aldershot, leaving only the man who had failed to pass in riding.

I went to Aldershot years later to mobilize a General Hospital for South Africa and was much struck by the splendid mess and gorgeous plate that the R.A.M.C. then had, and the comfort which pervaded the whole place, a great development after the Spartan simplicity of 1887, with its Crimean huts and glazed ante-room just like a photographer's studio.

Travel.

BY RAIL AND ROAD IN INDIA.

By Major L. B. CLARKE,
Royal Army Medical Corps.

(*Continued from p.* 231.)

II.—Burma.

A few hours after leaving Madras the 100-fathom line is reached, and here were deposited great quantities of old rifles and spare parts, safe in tropical seas from the disgruntled elements of the south or the border thieves of the north.

The passengers were few and were consequently made very much at home by the captain. His ship had come to grief during the war on a lonely jagged reef in the Red Sea and her bow destroyed, but a new one had been fitted and the ship made seaworthy, and it was impossible to tell where exactly the "join" had been made.

Our course lay nearly due east, and at this great distance from the north of the Bay of Bengal it was surprising to learn that the current from the Ganges affected the steering of the ship and that allowance had to be made for it in navigation.

On the third night the air became soft and balmy, the sea brown and turbid and there was every suggestion of land in the offing. At daybreak palm trees and mangrove swamps indicated the southern extremity of Burma, and we were soon steering up the muddy waters of the Rangoon River in a humid haze which boded ill for our comfort during the later hours of the day.

Rangoon is not on the sea, it is about thirty-five miles away, or four hours' steaming. The river is not the Irrawaddy, as is generally supposed, but the Hlaing River, and the Irrawaddy is many miles away to the west and takes many hours sailing to reach it.

A double line of ships at anchor parallel to the five-mile river front of Rangoon, warehouses, wharves, public buildings and railways, and in the background on a slight hill the golden spire of the great Shwe Dagon Pagoda, now rising through the haze of the hottest hour of Burma's hottest month, and we drew slowly into the pier and soon after landed in a country which was to be one's home for good or ill for the next two years.

One is often asked what Rangoon is like. The best answer is an English conservatory. The atmosphere is identical, the moist and oppressive heat is the same, and just as one sees in such a place at home flowers of the

most exquisite beauty so does one see in Rangoon vast quantities of brightly-coloured flowers such as crotons, cannas, fuchsias, etc. Then on a larger scale golden mohurs, flames of the forest, acacias, laburnums and many others whose names are unknown, and you have a veritable fairyland of tropic beauty.

The Shwe Dagon Pagoda, the Mecca of the Buddhist world, rises from Rangoon's only hill, superb and majestic, to a height equalling that of St. Paul's, and dominates the country-side for miles around. At night it is illuminated by electric light and the picture it then presents is a fantasy from the Arabian Nights. Covered entirely in gold, it is built on the conventional lines of all Buddhist pagodas with the inverted begging bowl of the priests below, next the turban, then the lotus motif of purity and finally, soaring into the sky, the great hti or weather-vane, studded with precious stones and valued at £50,000 sterling.

The tawdriness of the great Eastern seaport is offset by the graceful charm of the winding Royal Lake beneath the shadow of the Great Pagoda. Here for three miles a shady road encircles the irregular contours of a lovely lake whose jutting, palm-clad headlands alternate with backwaters of placid calmness, all serene and peaceful beneath the almost vertical sun of noonday or the romantic glow of a full-orbed moon at night.

Seen again in the monsoon the picture changes. Great banks of cloud come idling up from the Bay of Bengal, piled one on the top of another, coloured with the deepest of orange, indigo or black and, signalling to one another as on a gigantic wireless, decide finally to discharge their contents. Scarcely a rustle disturbs the foliage of the giant trees, but a roar as of an approaching train comes nearer and nearer till the whole world seems involved in vertical deluge. 120 inches of rain may fall in the five and a half months of the monsoon.

After several months of an almost completely saturated atmosphere with the thermometer in the higher nineties, when one's skin is never dry by day or night, the approach of the monsoon, heralded by tremendous thunderstorms, is welcomed for the improvement it will bring. This, however, is not for long, for no sooner has a storm abated than the sun comes out hot and strong, drawing the moisture in graceful forms up into the sky again, ready to fall with renewed violence and provide Rangoon with another of its celebrated fourteen-hour storms.

Another meteorological curiosity is the position of the sun. Rangoon is in the northern hemisphere. In all places in the northern hemisphere the sun at noon is in the south, a familiar phenomenon. In the tropics it it is of course high overhead and approaching the zenith, but in Rangoon at certain times of the year, viz., from May 22 to July 22 the sun is actually in the north at midday. This appears a paradox when one recollects that one is dealing with a latitude of 16° north. The explanation of course is that the tilt of the earth inclines all places south of 22° below the true equator and so Rangoon indulges at times in a northerly noon-day sun.

Probably very few people, even those long resident in these parts, realize this phenomenon, because the sun at this time of year is usually obscured by dense clouds, but on the rare occasions that it is seen during the monsoon the fact can be demonstrated quite easily by placing a stick vertically in the ground and observing its southward shadow.

The heat and heavy rainfall of Lower Burma produce a natural richness of colour on every hand. The vivid greenness of the grass, the greenest perhaps in the world, the variegated colours of tree and flower, the abundance of the crops, especially that of rice, Burma's greatest harvest, all these are the natural corollary to an intensely humid heat.

One dresses mostly in "shirt and shorts." Any other kit is extremely uncomfortable. At night, secure under a mosquito net from the myriads of flying insects which invade every house, one sleeps in silk pyjamas slips and a couple of twists of thin sheet round the middle. For about a fortnight only in the year is a blanket necessary.

A bath is a great mistake in Rangoon, whether in the early morning or at night. One emerges in a violent perspiration which the towel has no effect whatever in abating, in fact the exertion of applying the towel merely accentuates the sweat. A few minutes under a ceiling fan is far more effective and the skin is thus dry till one's clothes are on.

Every conceivable variety of flying, hopping and creeping insect is found in Rangoon in millions, night after night, and the lizards which inhabit every room in Burma wax fat in a land which so plentifully supplies them.

Although mosquitoes prevail, no primary malaria is found in Rangoon, but dengue carried by the *Aëdes argenteus* infects its English victims during their afternoon siesta and lays them low on an average once in two years.

Unique to this part of the world is the tucktoo, or gecko, which is often heard but rarely seen. It is a giant lizard two or three feet in length with stellate dorsal markings, which inhabits gardens and bungalow roofs. Quite harmless, it is somewhat of a nuisance on account of its nocturnal cry. It gets its breath in with a series of staccato jerks, and with inflated lungs commences a series of "tucktoos" amounting to a dozen or more in number and terminating with a self-complacent diminuendo grunt, as though to announce "I have done my best."

In India one hears the "Did you do it?" bird. Burma goes one better. Here is a little conversation heard near Rangoon one day: Four little birds sat on a tree. Number one was evidently being put through it. Number two asked, "Did you *do* it?" Number three, "Did you *really* do it?" and number four, "*Did* you?" The tone of number four left no doubt that Mrs. Grundy has her counterpart in avian morality.

The discomforts of Rangoon have their compensations in the social life and amenities of a great English settlement. There is a very large European population, and there is much going on, particularly in the "cold" weather, when many visitors come out from "home" for the season. The Gymkhana Club, one of the latest and largest in the East, is a well-run club with a

big membership. The residential Pegu Club built of ancient Burmese teak is dignified, picturesque and comfortable. The Race Course is all that the racing enthusiast can wish for, and alongside a course which is bigger than that of the Derby brand new buildings contain every conceivable device for getting rid of your money in the shortest possible time.

The Burman is a great gambler. He will bet on anything, from the result of a British soccer match, played in inches of slush in the pouring rain, to the comparative celerity of two snails on his own back wall. He likes peace and quietness and to be left alone to bask in the sun or to don the finest of fine raiment. Both men and women are always well dressed with a neat little white shirt or bodice and the universal lower garment called a loongie, made of the daintiest of coloured silk. The man makes no pretence to work, nor does he crave for money like his Indian brother. He merely requires sufficient to buy his food, to clothe himself well, buy a little jewellery, an electric torch and indulge in an odd gamble. His lady, on the contrary, though equally concerned for her appearance, is hard-working and business-like. While her lord and master basks in the sun, she goes off to the bazar, sells her wares, buys her household goods and probably returns with more money than she set out with.

The Burman, however, has many good qualities, and these appear to be largely due to his religion. The Buddhist faith teaches kindness to the lower creatures, and one never sees a Burman ill-treat an animal. It teaches also kindness to children, and the young Burmese kiddies, absolute replicas of the baby monkeys in the Rangoon Zoo, are perhaps the happiest in the world. His religion also gives him cheerfulness as to no other race in the East, and a crowd of Burmese is always laughing and full of fun.

The women are not in purdah, and all adults can read and write. The characteristics of these people, combined with their neat and artistic dress, distinguish them very favourably from those of India and, with all his faults, one cannot help liking the Burman.

Owing, however, to his dislike of hard work, all the menial labourers in Rangoon are Indians, Bengalis or Madrassis of low caste. Of such a type was the mali (gardener) working in the grounds of one of the residential hotels. Here an emerald-green lawn was surrounded on three sides by carefully tended flower beds. The proprietor of the hotel had given instructions to the mali to water the beds at 4 p.m. each day, and punctually to the minute the mali might be seen duly wielding his can. The sahib had, however, not said anything about the monsoon, and one day, in the middle of torrential rain the mali, dressed in a loin cloth with raised umbrella in his left hand and a can in his right, was seen delicately watering the flowers !

Another curious thing is recorded of the Indian labourers in Rangoon. Their capacity for sleep is unlimited. It is unaffected by time, place or circumstance. A favourite sleeping place is the gutter of a main street, where arms and head embarrass pedestrians and legs vehicular traffic. The most favoured place, however, is the railway line—the rail makes such a

good pillow—and then they are surprised when they are killed by a passing train! Many fatalities occur each year in this way on the Burma railways.

The new military cantonment of Mingaladon, which was opened in the cold weather of 1928-9, is situated about twelve miles away on slightly rising ground and affords far more pleasant conditions than Rangoon itself. The air is cleaner and fresher and the stuffiness of a town is absent. The excellent new barracks, hospital and officers' quarters have already been described in the Journal [1], and it only requires a passing comment that much of the discomfort of Rangoon itself is eliminated, and future generations of officers can be assured that they will be spared most of the climatic inconveniences of the old cantonment.

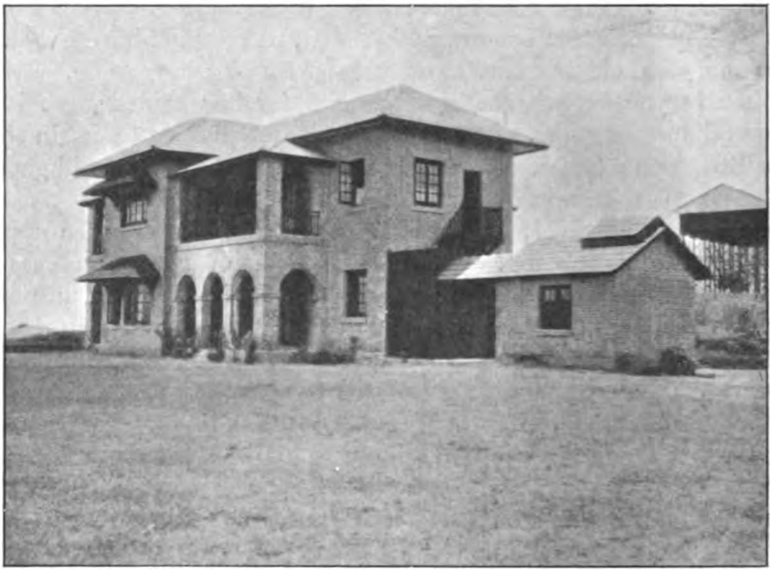

FIG. 1.—New type, officers' quarters, Mingaladon.

Motoring in the neighbourhood of Rangoon is confined to a single road running northwards. There is no road running down to the sea, innumerable waterways entirely preventing construction. In the north, however, the main road divides after passing Mingaladon, one branch going to Pegu and one to Tharawaddy.

A picnic close to the former place under a big spreading tree was noteworthy for an interview with an elderly Indian. As lunch was finished he appeared in sight ambling slowly and painfully up the road leaning heavily on a stout stick. He appeared to be about 80. As he drew near he was asked if he would like some food. His eyes and mouth opened wide and, accepting the invitation, he advanced towards the tree. He was given sandwiches, and as he was disposing of them in the multitudinous

folds of his ample garments he presented an excellent picture for a camera. His wizened face and decrepit figure, in the picturesque setting of a Burmese jungle, was a study not to be missed. As the camera was about to come into action, one's companion, an I.M.S. Colonel, remarked in Urdu, "This is of course really required by the police," whereupon the old beggar, with the alertness of a two-year-old, threw food and stick on one side and fled up hill as fast as a fugitive from justice was ever propelled by a guilty conscience. A cloud of dust was seen, nothing more, and the snap was never taken.

One's first journey up country was to Mandalay and Maymyo. There is no road to Mandalay, as is suggested by Kipling's poem, but one is being

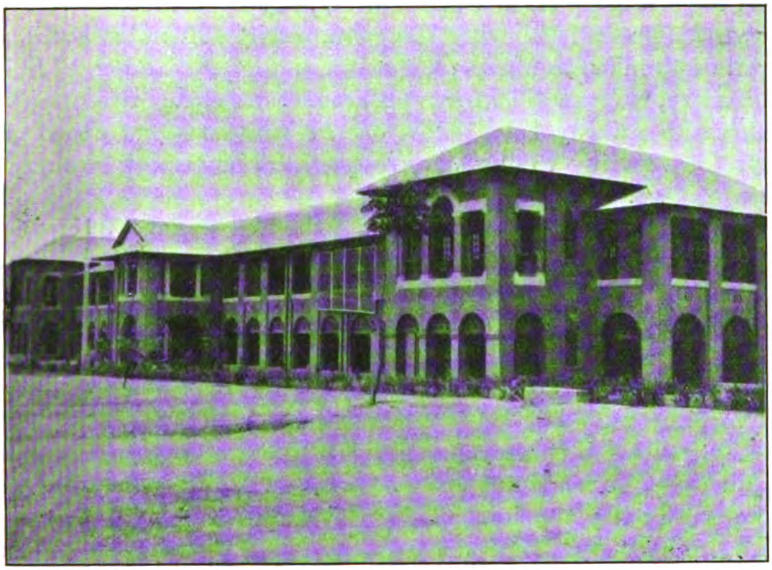

FIG. 2.—British Military Hospital, Mingaladon.

built and in a few years should provide excellent motoring. At the present time the journey is carried out by the Burma Railway, single line and narrow gauge, but fairly comfortable for all that.

On leaving Rangoon the country for miles and miles is seen to be dead flat and devoted to rice growing and so, during the monsoon with the abundant rain, the scene is that of a vast sea and one might well be travelling by ship, so complete is the illusion.

The single line to Mandalay was rushed up during the early months of the last Burmese War, and being insufficiently surveyed is liable to frequent breaches from flooding. The old Burmese paddy farmer requires irrigation for his fields. Occasionally he decides to open up one of his little bunds or dams to irrigate other fields. He does this entirely irrespective of the

water's destination, with the result that the railway may be inundated or washed away. At these times communication with Upper Burma is carried out by river, taking ten days to reach Mandalay, a serious and inconvenient state of affairs. The last journey which one did from Maymyo to Rangoon involved changing trains in the middle of the night, spending the remainder of it in a wayside station and arriving nine hours late in Rangoon through the line being temporarily submerged for many miles.

Mandalay, the old capital, is a strange mixture of the pleasant and unpleasant. It contains much of interest, notably the old Burmese Royal Palace, the great moated fort, now a modern cantonment, and pagodas in their thousands. It also contains much that is unpleasant in the way of dust, dirt, bad roads and the odours peculiar to the East. It is, however, the most important centre in Upper Burma, of great commercial importance. The town is almost level with Rangoon, nearly 400 miles away, and the short run of 40 miles to Maymyo, the summer capital and chief hill station of the country, is dramatic in its appearance. A sharp rise of about 1,000 feet takes the railway by a series of reversing stations up to gradually rising ground leading to the picturesque and charming scenery of the Maymyo plateau.

The dense and impenetrable jungle of the higher levels of Upper Burma is a feature which has stamped itself indelibly on every circumstance of life, from the character of the people to the commercial necessities of railways, roads and cantonments, on whose behalf a constant warfare is waged to secure elbow room from the ever-encroaching attentions of a hostile vegetation.

Maymyo, if left derelict, would in only a short space of time be completely covered by jungle, and archæologists of the future would have great difficulty in unearthing the old summer capital of a great province.

There is much game in the Burma jungles, but the difficulties of the terrain, combined with the fact that the Burman is not a good shikari, make any expedition often a very doubtful proposition.

The country north of Mandalay is wild, mountainous and attractive and marches with the Yunnan Province of China. The voyage up the river to Bhamo on a ten days' leave has already been described in the Journal [2], and it is sufficient to say that this expedition is one which should never be missed, for the whole scene is so vastly different from that of Lower Burma, that one can scarcely believe that one is in the same country.

The Lower Irrawaddy provides another pleasant ten days' holiday in a voyage from Rangoon to Mandalay. Here large steamers carrying 1,000 or more deck passengers pursue a leisurely course of 700 miles through the Delta and Lower Burma. The heat may be intense, and the "cold" weather is the best time to travel. Picturesque riverine villages and the gaily dressed crowds who throng the shores provide artistic and interesting entertainment at each of the numerous stopping places.

The vastness of Burma's timber trade may be seen from the frequent rafts floating down the river on their two months' journey from Bhamo to Rangoon. The teak, which is the hardest of the wood found in this country, is destined for the decks of battleships and merchant ships, the wood panelling of many a dining or sleeping car in Europe, and, near at hand, for the construction of vast numbers of wooden houses where hardness of wood is a *sine qua non* in a land where the white ant reigns supreme.

The other big industries of Burma include oil which is found on a large scale, the Burma Oil Company's pipe line running for 300 miles to Rangoon; silver-lead ore worked by the Burma Corporation at Namtu beyond Maymyo in a clearing of the jungle, now turned into a modern thriving town; precious stones from Mogok in Upper Burma, of which rubies are the chief;

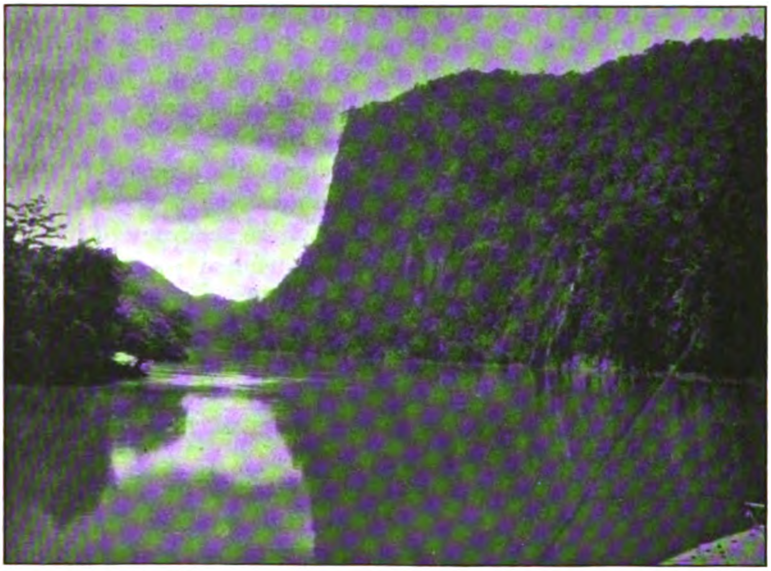

FIG. 3.—The Great Defile, Irrawaddy.

practically the whole of the world's supply of jade from near the Chinese border; rubber on a big scale in the lower part of the country, and on every bit of flat ground where water may remain, the inevitable rice.

The present depression of world trade is hitting Burma hard, but with the first suggestion of recovery the great staple trades should thrive abundantly.

Another ten days' leave was spent very enjoyably in a tour south by sea to Moulmein, Tavoy and Mergui, down the Tennasserim coast towards the Malay Peninsula. A night's crossing from Rangoon brings one under the shadow of Kipling's "Old Moulmein Pagoda," which, by the way, faces westwards to an estuary and not "eastwards to the sea," as one is led to suppose.

This old-world town is full of interest and there is much to see. The view from the Ridge at the back of the town comprises an inland scene of jumbled mountains, a bird's-eye view of Moulmein itself, and a river picture of odd craft, haze and somnolence.

Lured by the prospect of purchasing prisoners' handicraft, our party made their way to the local gaol, but the babu in charge of this department, as often happens in India, was away at his meal. Time was not lost, however, for the female element of the party soon cajoled the janitor into showing them the interior and many prisoners were seen.

Moulmein has an air of resignation and remoteness from the affairs of the world and wears the appearance of a once fashionable lady now letting lodgings. Formerly a capital, a big trading centre and a scene of much splendour, it now lives on its past, decaying slowly but genteelly and merging gradually into a haze of things forgotten.

The most interesting sight, however, is the working elephant. The elephant seems to be the only thing which does work in Moulmein. A timber yard down the river employs several of these great beasts in stacking the logs. The latter are floated down the Salween River and are brought into the shore below the town. Here elephants proceed to the water's edge and, with tusks below and trunk above, carry these huge objects slowly and sedately to some central point where accuracy of judgment and a sense of symmetry produce an evenly-constructed pile. The last placed log may project at one end. A foot is raised and the offending object pushed gently into position. If by chance it has gone too far, the other foot is raised and the log pushed back. Occasionally it may be too long and project at each end. This is more than the elephant can stand and, with a snort of profound disgust at the ways of man, he gives up the attempt and walks off to the next log.

These elephants are of considerable age, those we saw being in their working prime at about 60 years. Their rations are on the grand scale, and we saw small hay-rick suppers being served to several. The Burma elephant is a bigger animal than the Indian and approaches more to the African variety. It is interesting to note that in many thousands of miles travelling in India and Burma this was the only time an elephant was seen.

The day in Moulmein was brought to a close by a concert in the local hall, where both talent and audience left much to the imagination. An inelegant Anglo-Indian lady of mature age in the exuberance of her "tea cups" made frequent and determined attempts at friendship, and a hurried departure to the ship was made.

The next day found us anchored in the entrance to the Tavoy River about twenty miles below the town. Here a cargo of rice and wolfram was loaded on to the ship. Wolfram contains tungsten, the hardening agent for steel, and during the war, Tavoy with practically a world monopoly, made a fortune.

As evening approached our course was set southwards for Mergui, and we awoke the next morning in a world of pink. The walls of the cabin were pink, the sea and sky were the same colour, and through vast masses of pale pink clouds low over the water could be discerned a dark pink sun just emerging over the horizon. The extraordinary colour scheme, if recorded in a picture, would invite criticism of its unreality and aspersions might even be cast on the artist's sobriety, yet pink sunrises do actually exist and are no figment of the imagination. However, with the fuller light of day the colour scheme vanished and our course was continued over a calm and peaceful sea towards the Mergui Archipelago.

Thousands of islands, clad in the desert jungle, each in itself a veritable "south sea island," guard the approach to the town. It is a compact little place of wooden bungalows, situated on the edge of a sparkling estuary; behind are dense jungles of almost primeval forest, and on each side as far as the eye can see are vast stretches of mysterious mangrove swamps.

A chance encounter on the boat with a doctor of science led to a delightful trip in his company's launch. He was prospecting for tin under the sea, and his company had received a concession for this purpose from the Government of Burma. The launch, which was formerly an admiral's gig, was being tried out, and after a successful circuit of some small islands it was found to be seaworthy. An invitation was made and accepted for a longer trip the next day to explore a distant island and spend the night aboard. Interest was added to the occasion by the fact that, as far as was known, the island was not only uninhabited but had not been visited by Europeans since cartographers carried out the original survey.

It took us many hours to reach our objective. Far to the north of a lengthy island we saw rising out of the sea a great hump of jungle-covered mountain. The tide was out, and by means of the dinghy we landed at the south end and walked the full three miles of the island, stopping here and there to prospect for tin, collecting sand from the shore and washing it out in the "prospector's basin" till, in the sediment below, a few gleams of brightly-coloured fragments told us that traces at any rate of this valuable metal were present. Now and then a diversion inland was made and examination carried out of the soft screes at the foot of some steep and jungly nullah. Scarcely a sign of life was seen, just the occasional frightened twittering of some tropical bird of brilliant plumage in its haste to escape from the unknown dangers of human intruders. Many of these islands are notorious for their poisonous snakes, but fortunately none was encountered.

At the north end of the island the dinghy was ready to take us back to the launch, and as the latter turned the headland towards the open sea a great ball of fire was steadily submerging itself in a haze of sea and sky. At this latitude there is no twilight, the sun just goes down with a bump, as though some unseen force was rapidly extinguishing a gigantic light.

With darkness, our way was made down the western side of the island

to find a suitable anchorage near the northern end of another and larger island a short distance away. Only an electric torch was available with which to see, but although this would carry about a quarter of a mile it was almost useless in the dense blackness with which we were surrounded.

Fishing lines were out, a few small fish had been caught, and suddenly we passed from sixty fathoms to six and the engine was slowed. Lofty rocks suddenly loomed up ahead, the ship's course was altered, lines and cables became inextricably entangled, phosphorescent barracutta rose and fell in the water, and we came to anchor in an unknown bay in three fathoms of water. Here, in a somewhat heavy ground swell, we passed the night. A camp bed on deck creaked, groaned and swayed in the swell, and visions of marauding sharks caused it to be firmly lashed to one of the stanchions.

In the morning we woke in a new world in the middle of an opalescent bay, with a mile of pure white sand in front and jagged hills and dense forest behind.

A long walk ashore, exploration of the flotsam and jetsam of a recent storm, the interpretation of the footmarks of bird and beast in a lonely place, more searching for tin, a discussion as to whether to bathe or not, and finally vetoing it on account of sharks, back to the ship for lunch, and so the morning passed.

An afternoon's run back to Mergui over a dead calm and oily-looking sea brought the voyage of exploration to an end. Dinner at the doctor's house and the mail boat was caught at 10 p.m. Two nights and a day brought us safely back to Rangoon, and so concluded an interesting trip well off the beaten track.

Soon after this the move into the new cantonment of Mingaladon took place. It was rather a curious experience settling into a brand new house which had known no previous occupants, and much time was spent in initiating the servants into the mysteries of European sanitation!

And so with work and play the two years' sojourn in a beautiful and entrancing country drew to an end, and one's thoughts turned towards the long way home *via* the Far East and Canada, a journey already described in the Journal [3].

As farewell was said to this great country one wondered vaguely on its future; would it still grow from strength to strength with new exploration and discovery, would there be new wealth of mineral revealed, new sources of prosperity opened up, new development of civilization and a new appreciation of all that a great Power had done for it? These things lie beyond the unlifted curtain of to-morrow's play.

REFERENCES.

[1] "Our Newest Cantonment," Lieutenant-Colonel G. G. Tabuteau, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 1930, liv, 40.

[2] " A Tour Up the Irrawaddy," by the Author, *ibid.*, 1928, l, 222.

[3] "Eastwards Home from India," by the Author, *ibid.*, 1930, lv, 302.

(*To be continued.*)

Current Literature.

FAIRLEY, N. HAMILTON. **A Note on the Treatment of Sprue with Special Reference to a High Protein Milk Powder.** *Trans. Roy. Soc. Trop. Med. and Hyg.*, 1932, xxv, 297.

In this investigation, which was undertaken under a special grant given by the Colonial Medical Research Council, the author states that evidence is steadily accumulating that sprue is a disease of the gastro-intestine characterized by the deficient gastric secretion of both HCl and Castle's bone-marrow stimulating factor, as well as by malabsorption of fats, glucose and calcium in the small intestine. The basis of the gastro-intestinal derangement may represent either a metabolic breakdown or originate from some obscure infective agency involving the alimentary canal.

Sprue being essentially an alimentary disease, the theory of vitamin deficiency or monilia infection is no longer tenable as the primary ætiological factor, and the author considers that sprue is best treated by measures designed to rest the gastro-intestine. He gives three essentials for this :—

(1) The institution of alimentary rest by appropriate dietary.

(2) The treatment of megalocytic anæmia if present.

(3) The reinforcement of demonstrable deficiencies by such means as HCl, calcium and vitamin D.

The patient should be put to bed both in the initial attack and during relapse so as to ensure mental and physical rest. Patients recently returned from the tropics are especially to be guarded against chills.

Alimentary rest is the ideal aimed at, therefore overloading the stomach must be avoided, and this is best effected by non-bulky feeds at short intervals. Fats must be restricted and carbohydrate intolerance closely watched for. Severe relapses are often due to dietetic indiscretions precipitating attacks of acute enteritis. "Probably deficiency of the di-saccharide enzymes in the *succus entericus* associated with malabsorption of glucose leads to abnormal mono- and di-saccharide residues in the gut and so affords a basis for the excessive carbohydrate fermentation so characteristic of this disease."

The opinion of the author is that it appears rational to make protein the chief constituent of the diet, commencing with one of low calorie value and gradually increasing its quantity while still maintaining as a constant the high protein ratio, and these are the underlying principles on which the high protein, low fat, low carbohydrate diet has been evolved.

In 1930 the author reported on the successful results that followed

the employment of a high meat protein, low fat and low carbohydrate diet, which have since been fully confirmed.

In the present article are recorded the results obtained with a dried high protein milk powder, now available under the trade name of "Sprulac," containing a similar ratio of protein (1·0), fat (0·3) and carbohydrate (1·3) as that advocated by the author in 1930.

The ratios of protein, fat and carbohydrate in a normal diet recommended during the Great War by the Royal Society Committee were 1·0, 1·0 and 5·0, and these are compared in a table with cows' milk, buffaloes' milk and with Sprulac. The comparison shows that both cows' milk and buffaloes' milk, largely used in the tropics, contain a larger proportion of fat than that indicated under a normal diet. If a patient takes five pints of cows' milk daily the quantity of fat is in excess of the 100 grams advocated for a healthy man on a balanced diet of 3,300 calories.

It is evident from Aggarwala's analysis (given in the paper) that even three pints of buffaloes' milk may contain an excess of fat. Thus a sprue patient may be given more fat than a man doing a moderate amount of muscular work.

Owing to the two disadvantages of milk, especially in the tropics, viz., high fat content and invariable contamination, the author considered the possibility of the production by a commercial firm of a stable dried milk powder with a suitable protein, fat and carbohydrate ratio, for trial in cases of sprue at the Hospital for Tropical Diseases, Endsleigh Gardens.

The diets, in which the amount of Sprulac and other constituents are varied, advocated by the author in cases of sprue, are given in five tables, and the conditions under which these are changed are indicated. Liver extract is given in full dosage whenever megalocytic anæmia is present, and acid-hydrochlor. dil. and calcium lactate are administered if indicated biochemically.

In this report the results of treatment with Sprulac and liver extract are considered in ten consecutive cases. The average stay in hospital of these cases was 54·4 days.

Occasionally the monotony of the diet was complained of, but this was invariably overcome.

The effect on weight was that during the early stage of treatment this was reduced, but weight was gained when the later diets were reached. The average gain in weight of patients was eight pounds during their stay in hospital, and a considerable gain in weight has been invariably found at a later date.

Two typical cases are described in detail, and the hæmatological findings, on admission to hospital and discharge, in cases treated with liver extract (ex-hepa) and Sprulac are tabulated. This table shows an average gain in R.B.C.'s of 1,750,000 per c.mm., and in hæmoglobin of 20·2 per cent, with an average decrease in diameter of corpuscles from 7·9 to 7·6 microns (normal), while the colour index changed from 0·94 to 0·8. These findings compare

very favourably with those reported by the author in 1930 in seventeen cases, with fifty-three days in hospital, treated with high meat protein, low fat, low carbohydrate diet and liver extract.

The summary and conclusions of this paper are :—

(1) A preliminary report is made on the dietetic value of a high protein milk powder (Sprulac) in the treatment of sprue.

(2) This powder has been specially prepared so that the ratios of protein, fat, carbohydrate are 1·0, 0·3, 1·3.

(3) Though the alimentary features are not always as dramatically relieved as with a high meat protein, low fat, low carbohydrate diet, the end-results have been uniformly satisfactory in all cases.

(4) Provided adequate quantities of liver extract are administered, blood restoration proves equally rapid whether a high milk protein or a high meat protein dietary is adopted.

(5) Sprulac should have a special field of usefulness in the tropics, where good quality meat in a satisfactory condition is often unprocurable, and where milk, owing to its high fat and bacterial content, frequently proves an unsuitable diet for sprue cases.

ARMSTRONG, RICHARD R. **Immediate Pneumococcal Typing.** *Brit. Med. Journ.*, 1932, i, 187.

Determination of the type of pneumococcal infection is an essential preliminary to the administration of concentrated anti-pneumococcal serum, and this was described by the author and Johnson in the *British Medical Journal,* 1931, i, 931. The author of the present paper published in 1931, in the same journal, an account of a rapid method by which pnuemococcal types could be determined within four hours. This method consisted in the intraperitoneal inoculation of a mouse with the patient's sputum ; by the microscopic examination on a slide of fresh mixtures of the peritoneal contents mixed with type-specific agglutinating sera, the type could be ascertained.

It is stated that a number of tests made during the past winter have proved, without exception, that the type can be decided with ease and certainty by "direct test" on the patient's sputum, without recourse to mouse inoculation.

The following is Armstrong's procedure :—

A suitable fleck of sputum is selected. Three samples of this are placed, equidistant, on a microscope slide, and numbered 1, 2 and 3. With a platinum loop each sample is emulsified with four times its volume of corresponding diagnostic serum. After the application of cover-glasses the slide is set aside for a few minutes ; meanwhile a further sample from the fleck of sputum is smeared on a slide, fixed by heat and stained by Gram's method. The general bacterial flora of the sputum and the number of pneumococci present are seen at a glance in the stained film, which exactly

represents the characters of the sputum samples selected for the diagnostic test. Information as to the character of these should be obtained in advance, as if the pneumococci are numerous a positive result in the typing will be at once seen. If there is no reaction, as, for example, in the case of a Group IV infection, no time should be lost in a useless search.

Using a 4-ocular, $\frac{1}{6}$-inch objective, and plane mirror, with the condenser removed, the slide with the fresh emulsions of sputum and specific sera is examined. The result, in the case of a positive reaction, is a conspicuous increase in the size of the individual pneumococcus, due to conjugation of coccus and homologous antibody, whereas, in a negative test, the unstained pneumococci, when present in small numbers, are just visible. Enlarged cocci have a ground-glass appearance, with a highly refractive peripheral zone. A positive reaction is sometimes apparent to the naked eye. Also when compared with its companion on the same slide (controls) it is seen to be opalescent, due to great increase in size of the "sensitized" cocci. When the pneumococci are thickly coated with sero-mucinous pneumococcic secretion, the characteristic appearances develop more slowly as the specific serum soaks through, and in such cases twenty minutes may elapse before full completion, although the type may be distinguished much sooner by the change in free floating pairs. Type is decided independently of actual agglutination, which is apparently prevented by the viscous nature of the sputum.

The author, in a commentary, states that the results of "direct test" have been confirmed in every case by mouse inoculation and other more deliberate methods used in the laboratory. The test has proved trustworthy and is extremely simple and swift. He is of opinion that since animal inoculation is no longer necessary and a knowledge of bacteriological technique is not essential for carrying out the test, the objection that pneumococcal type cannot be decided in general practice now disappears.

Immediate typing of late cases of pneumonia is described as a matter of minutes, owing to the more profuse sputum and more numerous pneumococci. No time is thus lost in the intravenous administration of serum to the patient.

More care, however, is required in cases of early pneumonia, when the sputum may be scanty and the pneumococci few, and in these a second examination may be necessary.

The author states that type may be decided with equal care and speed by the direct method in the case of cerebro-spinal fluid, empyemata pus, aural discharges, etc.

The usefulness of the test is confirmed by R. Sleigh Johnson, who, in conjunction with the author, is carrying out the diagnosis and serum treatment of lobar pneumonia, and the Medical Research Council is assisting the inquiry.

LOGAN, W. R., and SMEALL, J. T. **A Direct Method of Typing Pneumococci.** *Brit. Med. Journ.*, 1932, i, 188.

This paper follows Armstrong's article, referred to above, and the authors state that they fully agree with him that his microscopic method is superior to other rapid methods and particularly to the macroscopic-agglutination technique. They are of opinion that it is only in the case of pure cultures free from cells that the macroscopic method has advantages.

The authors have typed about 170 specimens of sputum from cases of lobar pneumonia during the last twelve months. They used various methods in each case and always confirmed the result of the direct test by isolating the pneumococcus and determining its type when obtained in pure culture. Their object in the present paper is to show that the phenomenon makes it possible in some cases to recognize the type of pneumococcus by a direct test with the sputum emulsion, and they state that it is possible in some cases to do this within a few minutes of receipt of the specimen.

Their technique is essentially that of Armstrong's.

Sixteen specimens of sputum were tested from cases of lobar pneumonia and a provisional opinion noted prior to the mouse test and the isolation of the organisms for typing in pure culture. Five proved to be Type I, ten Type II, and one Type III. A direct test was also carried out with pus from an empyema due to Type I pneumococcus, and with the purulent cerebro-spinal fluid from a Type II pneumococcal meningitis. The agglutinating serum had a titre of between 1/20 and 1/40.

Details of the results of the direct tests are given :—

Of the Type I cases (5), two were correctly diagnosed by the test; two were thought to be probably Type I; and in the other no recognizable pneumococci were seen either by the direct method or in the mouse peritoneal exudate four hours after inoculation.

Of the Type II cases (10) seven were correctly labelled by the test. Of the remainder, one was thought to be *probably* Type II, one reacted to both Types I and II serum, and the other showed no pneumococci, nor were any seen in the mouse peritoneal exudate four hours after inoculation.

In the Type III case, at first no pneumococci were recognized. The original specimen was re-examined when the mouse method had shown it to be Type III infection, and pneumococci with enormous swollen capsules and sharply defined, rather crenated, outlines were seen in the Type III mixture. The sputum was old when examined the second time, and no pneumococci could be recognized in the other serum mixtures or in the control.

The Type I empyema specimen and the purulent cerebro-spinal fluid from the Type II meningitis were both readily typed by the direct method. Both were confirmed by isolation and typing of the organism.

The authors do not suggest that the direct test is applicable in all cases, or that it should supplant the more reliable methods. They state that the

test requires some bacteriological experience and would be quite unsuitable in a side-room. [This opinion is at variance with the view expressed in the previous paper by Armstrong.] They mention the possibility of the inexperienced mistaking small yeasts, starch granules, etc., for swollen pneumococci, while a normal Type II pneumococcus might be mistaken from a swollen Type I or II. The test is thought to be of value to the bacteriologist, because, if definitely positive, it may help the patient by its rapidity and obviate the necessity for the bacteriologist to visit his laboratory at inconvenient hours. They emphasize the necessity of confirming the result in all cases by a more reliable test, including the isolation of the pneumococcus and the typing of a pure culture.

Reviews.

TOWARDS NATIONAL HEALTH. By J. A. Delmege, O.B.E., M.R.C.S., L.R.C.P., D.P.H. London: William Heinemann (Medical Books), Ltd. 1931. Pp. xiv. + 234. Price 21s. net.

In this volume the author tells the story of health and hygiene in England from Roman to Victorian times, with a brief preliminary account of hygiene in earlier civilizations. The reader will be struck by the high standard of public health measures under the Romans. Their fine schemes of town planning and housing. Magnificent water supplies; with a larger allowance per head of the population than is found in any modern capital. Their baths, water and sun; and their system of central heating, superior to our steam heating of to-day. Yet in spite of all this a Roman boy of 15 had an expectation of life of only 20 years, compared with the 45 years of a modern English boy of the same age. The difference, as the author points out, probably being due to the failure of the Romans to cope with epidemic disease. Then follows a long chapter on the public health in England during the Dark and the Middle Ages, with their long catalogue of plague and pestilence; and so the narrative proceeds, century by century, becoming more detailed as we approach modern times, and finally ending with the Public Health Act of 1875.

The primary object of the book is to instruct, but it is infinitely more attractive and enjoyable than the majority of books written professedly to entertain, and holds the reader's interest from start to finish. The style is delightfully easy, and the author seems never to repeat himself in his successive accounts of similar happenings. Whether he avoids this literary difficulty by reason of some natural gift for narration, or whether his art is so finished as to conceal itself, the reviewer cannot tell. Certainly there is no trace of any studied "elegant variation."

The interest of the book is much increased by the inclusion of nearly a hundred illustrations, well chosen and excellently reproduced.

As is inevitable in so wide a study, an occasional slip of the pen may be detected, as on p. 57, where the Plague of Justinian, and that of A.D. 664, are confused. Also sometimes the author's statements go beyond the known evidence, or even contrary to it; for example, on page 221, where he says "The Plague of Justinian and the Black Death were almost certainly pneumonic plague." If so, why was the former called the *lues inguinaria* (groin disease), and why in every contemporary symptomatic account of the Black Death are buboes the chronicler's main theme?

Readers of the *Journal* will find an added interest in this delightful volume, for it is "gratefully dedicated" "to my old Commanding Officer, Lt.-Col. H. E. R. James." A graceful tribute, and one that does honour both to the recipient and to the dedicant. W. P. M.

MODERN MEDICAL TREATMENT. By E. Bellingham Smith, M.D., F.R.C.P., and Anthony Fielding, M.D., F.R.C.P., with an Introduction by Sir Humphry Rolleston, Bart., G.C.V.O., K.B.E. London: Cassell and Co., Ltd. 1931. Vol. I, pp. xvii + 701; vol. II, pp. vii + 705. Price 30s. net the two volumes.

In most textbooks of medicine much space is given to every aspect of a disease, but very little is allotted to treatment. So wide has the scope of therapeusis become that such brief summaries as "six weeks and a bottle of paregoric" are to-day no longer appreciated. The modern student and practitioner must of necessity be acquainted with not only the older drugs from the pharmacopœial medley which have proved their worth, but with a host of new synthetic ones. He must have a working knowledge of massage, electro- and helio-therapy, balneology, dietetics, calorie and energy values, the importance of vitamins, endocrines, and a whole host of other things too. Although, as Sir Humphry Rolleston says in the Introduction, diagnosis is the most important aspect of the science of medicine, Modern Medical Treatment presents to us the next important essential of the duty of a medical man to his patient, that is, the correct and appropriate treatment. In order to assist in the general management of a patient, the authors have included a brief review of the ætiology and symptoms of the morbid condition under discussion, while those complications which call for special therapeutic measures are mentioned. Prognosis also, so far as it affects treatment, is also considered. The lines of treatment set forth have stood the test of trial in the hands of either or both of the authors, and they have made a feature in not advising any measure the value or efficacy of which is problematical. The work is comprehensive and much attention is given to detail, even at the risk of repetition. It includes suggestions for all conditions likely to be encountered in ordinary practice and for rather more unusual diseases. Many maladies of a tropical or subtropical nature have been considered.

It is impossible in this short review to discuss the various sections in detail, but the reader can be assured that he will find therein a mine of

information, and if the work is regarded as a textbook of medicine with a greatly enhanced space for therapeutics, it can be warmly recommended. With regret we observe the reproduction of obsolete nomenclature of the common parasites as exemplified by *Oxyuris vermicularis*, *Trichina spiralis* and *Tænia echinococcus*, but this fault does not detract from the general utility of the work.

Each volume contains a full and complete index to both volumes, and to a medical officer in any of the Services it should prove a welcome and valuable addition to his portable library of medical works. R. P.

HANDBOOK OF SKIN DISEASES. By Frederick Gardiner, M.D., B.Sc., F.R.C.S.E., F.R.S.E. Third Edition. Edinburgh: E. and S. Livingstone. 1931. Pp. xi + 283, 13 plates and 46 figs. Price 10s. 6d. net.

Dr. Gardiner's book needs no introduction to our readers, for the excellence of its two previous editions has given it an established position as one of the best of its kind on the market. The author has brought the previous volume up to date, keeping in mind his original object of providing a handbook for the general practitioner and medical student. He deals with commoner skin diseases and their treatment in a clear and interesting manner that makes for easy reading. The book is beautifully produced; the illustrations, especially the coloured plates, are very well done. No one could wish for a better book.

AN INTRODUCTION TO HYGIENE. By W. Robertson, M.D., D.P.H., F.R.C.P.E. Edinburgh: E. and S. Livingstone. 1931. Pp. viii + 207. Price 6s.

As one would expect from an author with such a wide experience in the teaching and practice of Public Health, this is an excellent compendium of information for students and beginners and will also prove useful as a handy book of reference for Army medical officers generally, particularly when they wish to compare civilian practice with that of the fighting services.

Apart from one or two very minor printer's errors the book has few faults. In the chapter on Infectious Diseases, I think the part dealing with typhus fever requires some amendment, e.g., page 57, "The disease is spread from one person to another by body lice—*Rickettsia Prowazeki*." This suggests to me that "Rickettsia Prowazeki" is the name of the body louse! Again on page 59 it is stated that to deal with body lice wooden skirtings in rooms have to be removed and old wall-paper stripped. In my experience, while bugs and cockroaches are frequently found in such situations, body lice never favour them.

In the chapter on Disinfection a short reference to the use of downward displacement current steam would be of interest.

In other respects the book admirably fulfils the author's purpose of furthering the study of hygiene by an undergraduate who has developed an interest in public health problems. P. H. H.

Florence Nightingale. A Biography. By Irene Cooper Willis. London: George Allen and Unwin, Ltd. Pp. 255. Price 7s. 6d. net.

Miss Irene Cooper Willis has done a clever piece of work in writing this biography of Florence Nightingale and getting so much into her 255 pages. Miss Willis gratefully acknowledges her indebtedness to Sir Edward Cook's well-known two-volume biography, and her references and quotations from that standard work have been carefully chosen.

Her work will now enable many more to read, in a handy form, the life story of one of the most remarkable women the world has ever known.

A. C. H. G.

Medical Emergencies. By Charles Newman, M.D., M.R.C.P. London: J. and A. Churchill. 1931. Pp. ix + 128. Price 8s. 6d. net.

This is designed as a companion volume to "Surgical Emergencies in Practice," an emergency being taken as a condition in which accurate diagnosis and prompt correct treatment are necessary to save life or prevent great suffering. It is surprising to see how many such the author has found to include in the category—so many that one cannot begin to enumerate them in a short review such as this. They are grouped under the headings of Poisoning, Coma, Convulsions, Circulatory Failure, Hæmorrhage, Asphyxia, Colics, Sudden Insanities, and Miscellaneous Emergencies.

After a very succinct description of each condition, very precise and dogmatic directions are given for the immediate treatment. Such operations as tracheotomy, blood transfusion and lumbar puncture are well described.

There is so much of practical value in such small compass that we can confidently recommend this volume to all in practice. It is a book to carry about with one.

Correspondence.

SALIVA-BORNE DISEASE CONTROL.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Sir,—Major A. L. Stevenson's article in the February number of the Journal comes as a welcome note to those who are not too easily led from the realms of common sense and practical experience. Cumming's investigation which Stevenson criticizes never impressed me.

It may occasionally happen that organisms responsible for diseases of the respiratory tract survive on messing utensils after washing, but that these are picked up on food or in drink and deposited on the naso-pharynx or elsewhere on the tract in sufficient numbers to cause disease must, if it occurs at all, be a very exceptional event, and especially so in the case of fluids which remain in the throat only a fraction of a second.

The whole matter seemed so improbable that I was disinclined to believe it, and when the following outbreak occurred I became more sceptical than ever.

My son and another boy are the only day boys at a preparatory school where the boarders number fifty-three. An epidemic of mumps broke out at the commencement of the autumn term. As day boys these two did all but sleep in school, having dinner and tea there and mixing freely with the boys not in quarantine.

On November 12, when only ten of the boys remained uninfected, in order to protect other members of my family I decided to send my boy as a boarder, and the father of the other boy did likewise. Three weeks from the date of their becoming boarders they developed mumps, in fact they were the last in the whole school to catch the disease, which, if spread by crockery to the extent claimed by Cumming, must certainly have developed in them much earlier ; either that or we must consider the whole affair a mere coincidence. I prefer not to.

I may add that the ordinary domestic methods of "washing-up" existed in the school.

R.A.M. College,
*London, S.W.*1.
February, 1932.

I am, Sir, etc.,
D. T. Richardson,
Major, R.A.M.C.

HEALTH REPORT OF THE ARMY FOR 1930, p. 104—UROBILINURIA IN THE DIAGNOSIS OF MALARIA.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Sir,—I worked at this subject when a Major (T.) R.A.M.C., and have records from Alexandra Hospital, Cosham, of twenty-three cases which all showed urobilinuria when attacked, but I write to draw attention to a note (*Lancet*, June 6, 1914) which may have interest. It abstracts a paper by Dr. Sorensen, of the Dutch army, contributed to the *Archiv für Schiffs- u. Tropen-Hygiene* for March, 1914 (filed in the Royal Society of Medicine). He was working at Flores, in the Dutch East Indies, where he noted that urobilinuria, most easily recognized by a direct-vision pocket spectroscope, occurred during pyrexia in all three forms of malarial fever, and in some, but not in all, cases before relapses. Also it gave early warning of oncoming blackwater fever, so he got these cases early and managed to get them well unusually quickly. He devised too a quantitative colorimetric test he found useful. It might be well for those interested to look up his paper, as this subject is attracting attention.

The idea seems to be that urobilinuria evidences hæmoglobin destruction which is more marked in the beginning of malarial than of other fevers, and

so may be almost pathognomonic of malaria in the earliest stages of the disease, though in other fevers it is found later in their development.

I am, Sir, etc.,
W. E. HOME,
Fleet Surgeon, R.N.,
Late Major (T.) R.A.M.C.

Southborough, Kent,
February 4, 1932.

Notices.

MONOGRAPHS ON PRACTICAL MEDICINE.

WE would draw attention to the series of small, inexpensive pocket monographs on practical medicine now being issued by John Bale, Sons and Danielsson, Ltd.

These books are of handy pocket size, clearly printed and well bound. The cost of each volume is 2s. 6d., or 3s. post free.

The publishers state that the series is designed to supply authoritative and up-to-date information on subjects of daily importance to general practitioners, and, judging by the volumes we have seen, their claim is well justified.

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The following are in preparation :—

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"The Management of the Nervous Patient," by M. D. Eder, M.D. B.Sc.

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"Physiology in Modern Medicine," by Samson Wright, M.D., M.R.C.P.

THE TWENTIETH ANNUAL SERIES OF CHADWICK PUBLIC LECTURES.

Dr. J. D. Rolleston's lecture on The Life and Work of Sir Benjamin Ward Richardson—great medical pioneer of the Science of Sanitation and first postulator of the establishment of a Ministry of Health—marked the beginning of the Twentieth Annual Series of Public Lectures provided under the bequest of Sir Edwin Chadwick for the advancement of sanitation, the promotion of hygiene and the prevention of disease.

The programme of lectures, thus inaugurated, equals in its promise of interest and education any of the thirty-nine (for each year has seen published a Spring and an Autumn programme) that have preceded it.

The main theme of health will be regarded from a variety of aspects by lecturers of medical, architectural and scientific qualifications, well able to teach fundamental doctrines of sanitation and to picture things to come in scientific discovery, physical environment and official administration.

Early in April the delivery by Sir Humphry Rolleston in Paris (in the grand amphitheatre of the Faculty of Medicine of France) of a lecture on "The Pioneers and Progress of Preventive Medicine" will be an event of some significance, since Sir Humphry will be the first Chadwick Lecturer to go beyond the shores of Great Britain, although distinguished Professors from other countries, France, Switzerland, Holland, Germany, Sweden, and the United States, have responded to invitations of the Chadwick Trustees to lecture in London.

The visit of Sir Humphry Rolleston to Paris in April will assuredly recall long ago visits of the Founder of the Chadwick Trust to Paris. It was under the *régime* of Napoleon III that Sir Edwin Chadwick, the "Father of Sanitation," was in Paris advising on questions of that city's health. "Fair above, Sire, but foul below" was reported as his appraisement to the Emperor of the beautiful city then being munificently reconstructed and planned.

Yet greatly as Chadwick was honoured as a Fellow of the *Société d'Hygiène Publique*, the *Institut de France* and other bodies for the improvement of human conditions, we may expect that even as generously will members of educational and scientific societies seeking for and enunciating better principles of living in France to-day, to say nothing of intelligent persons in the British and American colonies in Paris, honour Sir Humphry Rolleston when, under the auspices of the British Institute in Paris and in the presence of the British Ambassador to France, he gives the first Chadwick Lecture in that city.

Already the delight expressed by French *confrères* in accepting the Chadwick Trustee's offer of the lecture is guarantee of its cordial reception.

Later in April (on the 28th) Dr. James Sequeira, who arrived in England from Kenya Colony in March, will speak on "The Educational Aspect of Public Health Work in the Tropics" in the Council Room of the

British Medical Association. This lecture comes in sequence to many other accounts of warfare against Tropical Diseases given under the Chadwick Trust; the first and not the least noteworthy having been on Civil and Military Sanitation in the Tropics by Sir Ronald Ross. Since then, the late Sir Andrew Balfour, Dr. Emile Brumpt (of Paris) and Dr. Blacklock have been among Chadwick Lecturers on problems of Tropical Disease Prevention. Dr. Sequeira's instructions are likely to be as helpful as any that have gone before.

Somewhat distinct from ordinary health topics, yet as sidelights of great interest and attraction, will be the Malcolm Morris Memorial Lecture on "Dermatology as an Outpost of Medicine," by Sir Ernest Graham-Little, at the Royal Society of Arts on May 23, at 5.15, and Dame Helen Gwynne Vaughan's discourse in the open (weather permitting) at the Chelsea Physic Garden on June 9, at 5 o'clock, on "The Contribution of Plants to the Study of Heredity."

All Chadwick Public Lectures are free and no tickets are required for them.

Further particulars may be obtained of the Secretary, Mrs. Aubrey Richardson, O.B.E., at the Offices of the Trust, 204, Abbey House, Westminster.

BRITISH RED CROSS SOCIETY—COUNTY OF LONDON BRANCH.

Tropical Hygiene.

A course of seven lectures and demonstrations (illustrated by lantern slides) on Tropical Hygiene, will be given on Monday, Wednesday, and Friday afternoons, at 9, Chesham Street, S.W.1, commencing Monday, April 4, 1932, at 5.30 p.m.

The course, which will cover such questions as food, clothing, and the medical and sanitary precautions necessary for health in warm climates, will be conducted by Major D. T. Richardson, M.C., M.B., D.P.H., Assistant Professor of Hygiene, Royal Army Medical College, London.

An examination for the Society's Certificate in Tropical Hygiene will be held on Wednesday, April 20, at 5.30 p.m.

Fees.—Members of Red Cross Detachments and Q.A.I.M.N.S. 5s. per course, non-members 7s. 6d. per course, or 1s. 6d. per lecture. Entries should be made and fees paid not later than March 19.

Inquiries should be addressed to and cards of admission may be obtained from the County Secretary, British Red Cross Society, 9, Chesham Street, S.W.1. Telephone: Sloane 8148.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a nom-de-plume.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

A free issue of twenty-five reprints will be made to contributors of Original Communications and of twenty-five excerpts in the case of Lectures, Travels, Clinical and other Notes, and Echoes of the Past.

Reprints or excerpts, additional to the above, can be furnished on payment if specially ordered at the time of submission of the article for publication.

Communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, War Office, Whitehall, London, S.W. 1."

MANAGER'S NOTICES.

The Annual Subscription for the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is £1 payable in advance. Single copies, 2s. per copy.

Cheques, etc., should be made payable to the "Journal R.A.M.C.," and crossed "Holt & Co."

Each subscriber who pays his subscription direct to the Manager will also receive monthly a copy of "The R.A.M.C., The A.D. Corps, and Q.A.I.M.N.S. *News and Gazette.*"

Communications in regard to subscriptions, change of address, etc., should be addressed "THE MANAGER, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.2, WAR OFFICE, WHITEHALL, LONDON, S.W. 1."

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LIEUTENANT-COLONEL A. DAWSON, R.A.M.C.

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VOL. LVIII. MAY 1932. No. 5.

Journal of the Royal Army Medical Corps.

Original Communications.

THE SURGEON AND OLD-TIME PLAGUE.[1]

BY BREVET COLONEL W. P. MAC ARTHUR, D.S.O., K.H.P.
Royal Army Medical Corps.

MY LORD PRESIDENT, MASTER OF THE WORSHIPFUL COMPANY OF BARBERS, LADIES AND GENTLEMEN,—Even if I were a surgeon of distinction, I should be proud to speak in this historic theatre. But I admit with shame that I am not a surgeon—my very gown bewrayeth me—and so, my Lord, I am the more honoured.

In this lecture there are concerned an ancient Guild of the City, and this College. Further, in accordance with custom, the invited audience includes distinguished members of the laity. I fear it would be quite beyond my power to hold the interest of all these diverse elements at one time. Therefore, if each part of my varied discourse appeals to some section of the audience I shall be more than content.

In the first place I would beg the indulgence of my professional brethren while I explain, very briefly, some elementary facts regarding plague, for the benefit of those here who have not studied medicine. I suppose it is common knowledge to-day that human plague is always an accidental extension of preceding or concurrent plague affecting the lower animals. Many animals suffer from plague as a natural infection, but as regards the transference of the disease to man, all others sink into insignificance in

[1] Being the Thomas Vicary Lecture for 1931, delivered before the Royal College of Surgeons of England, and printed by permission of the President and Council.

comparison with rats. I presume, too, that it is common knowledge that plague is spread from rat to rat, and from rat to man, by fleas. When the infected flea deposits plague bacilli on the skin, these germs pass along the lymphatic vessels and cause an inflammation in the first group of lymphatic glands they encounter, most commonly those in the groin. For this reason these swollen glands were called "buboes," from the Greek word for the groin; but the term was later extended to include all such inflamed glands wherever situated. Whence we speak of "bubonic" plague. Other external signs in plague are carbuncles, blains and tokens, but these are less common in plague to-day than they were in old times. The plague carbuncle commences as a little patch of inflammation in the skin, and the infected area increases in size and becomes gangrenous. The blains—we have the same word in "chilblain"—are small blisters, white or black in colour. The tokens are small hæmorrhages into the skin, and are of very grave significance. Shakespeare speaks of "The tokened pestilence where death is sure," and declares again, "The death tokens cry, 'No recovery.'" Boghurst, who wrote by far the best clinical account of the London plague of 1665, calls tokens "The forehorses of Death's Chariot," and says again that they are sent by God to warn the sufferer "that hee is now steering out of the river into the ocean, out of this narrow compass of tyme into the wide ocean of eternity."

In intense infections the patient may be overwhelmed by the virulence of the attack, and die before buboes are seen externally. Such cases without apparent buboes are called septicæmic in the convenient clinical grouping. Sometimes the plague bacillus attacks the lungs, and sets up a virulent and most fatal pneumonia. This pneumonic plague differs in one important essential from ordinary plague, for it is intensely infectious from person to person, and having begun it may assume epidemic form and spread independently of rats and fleas.

From this it is evident that plague is not a disease of primitive man leading a nomadic life, but affects populations sufficiently civilized to build themselves towns, but not civilized enough to keep them clean, and who in consequence share their dwellings with rats and fleas.

The earliest epidemic of plague recorded in Western Europe was the great pestilence of A.D. 543, which the Latins called the *lues inguinaria*, that is, the groin disease, a sufficient indication of its nature. Although there is no mention of it in the *Anglo-Saxon Chronicle*, it is incredible that England could have escaped the visitation, for Ireland felt the full weight of the calamity, and the chroniclers there assert that it afflicted the universe, and swept away the noblest third of the human race. In 664 another pandemic of plague devastated Europe. The Venerable Bede, who lived through one extension of this pestilence, describes its general course in England; but his brief formal account in the *Ecclesiastical History* gives no diagnostic characters; and neither in the Latin nor the Anglo-Saxon version is there any descriptive name for the disease, only general

terms for epidemic being employed, like *pestilentia* in the Latin text, and *wool* in the Anglo-Saxon. But in another of Bede's writings, the *Life of St. Cuthbert*, he mentions incidentally that when a certain abbot was attacked with this pestilence, "the swelling which arose in his thigh" died down and left no ill result, the whole passage suggesting that swellings in the thigh, that is, inguinal buboes, were a usual feature of the epidemic. This is confirmed by the Irish chroniclers, who in recounting the ravages of the pestilence in Ireland call it by the archaic Erse name for bubonic plague.

For the next 600 years we know nothing of plague in England. The chronicles contain brief entries of pestilence, but it is impossible to identify any of these as plague from the meagre details set down, and so I pass to the universal epidemic in the fourteenth century that to-day is commonly called "The Black Death." Contrary to what many textbooks assert, the word "black" in this name has no reference to any symptomatic manifestation of the disease. Here it merely translates the Latin word *ater*, meaning black in the sense of terrible. All the Latin chroniclers who describe the black blains and tokens in this epidemic invariably use the word *niger* for black in colour, and never *ater*. At any rate, this convenient term, whether in Latin or English, was never used in this country—in chronicles, in general literature, or in spoken speech—until it was introduced from Germany in modern times.

As regards England, the Black Death broke out in Weymouth in early August, 1348, and raged for over a year, making of the country a vast charnel house. Gilbert le Baker, a monk of the time, declares that nine out of every ten of the people were swept away. This is no exaggeration as regards certain communities, for we know that in one manor in Oxfordshire there were only two survivors, that in Croxton monastery in Lincolnshire only the abbot and the prior escaped alive, and that in Sandon monastery in Surrey all the dignitaries and the brethren lay dead together. But it is an overestimate of the mortality in the whole country ; probably about half of the population perished.

The English monastic chroniclers, Henry Knighton and Gilbert le Baker, and the Irish Franciscan, John Clyn, describe succinctly but clearly the buboes, carbuncles and other plague signs, and thus put the identity of the pestilence beyond all question. Much in this kind we learn from the monks. What have the professional physicians left us? Not a line, not a word, nothing. John of Gaddesden, and other notable physicians, flourished at the time, but they were shackled by tradition. In the writings of the Fathers there was no word of the Black Death, and so their disciples sat silent while the greatest calamity that has ever befallen mankind unfolded itself before their eyes. If even the least of the physicians then alive had taken up his pen and written down what he witnessed in the course of one day, by that single act he would have put on immortality. But their eyes were holden, and they could not see.

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It is to the eternal glory of surgery that a surgeon accomplished the work wherein the physicians had failed, and in Guy de Chauliac's *Chirurgia Magna* we find the best contemporary medical account of the Black Death. This great surgeon considers plague to be a corruption of the body, as is evidenced by the formation of internal buboes. In the process of evacuating this corruption, the body forms external buboes through which the poison is discharged. These external buboes are situated in the neck, the axilla and the groin. The corruption affecting the brain is thrown off by the buboes in the neck; the heart discharges its poison through the axillary buboes; while those in the groin free the liver in the same way. The most intense form of plague is caused by the failure of the body to form external buboes, which therefore retains within itself the gross and corrupt humours. Such is Guy de Chauliac's ingenious explanation of the differences he observed in the symptoms and severity of bubonic and septicæmic plague.

The Black Death began in Avignon in January, 1348, and lasted for seven months. For the first two months, says Guy, the disease was of his first type, without external buboes, and was characterized by continued fever, blood-stained sputum, and death within three days. For the succeeding five months, buboes were the outstanding feature, and death ensued within five days. So great was the contagion, he says, that the healthy were smitten even by looking at the sick, and died unattended, and were buried without priests. The father would not visit his son, nor the son his father. Charity was dead, and hope abandoned. This plague could not be likened to any others, for they had been confined to one region, but this afflicted the universe. Others could be cured in some manner, but this in none. It brought shame to the physicians, for their remedies were useless. Because of contagion they feared to attend the sick. If they visited them they wrought no cures and accomplished nothing, for all the sick died except some few who escaped by reason of the suppuration of the buboes. Guy himself contracted plague. Towards the end of the pestilence, he says, "I fell into a continued fever with a bubo in the groin, and lay sick for almost six weeks, and was in so great peril that all my friends believed I should perish; but the bubo breaking down, and being treated as I have said, I escaped by the will of God whose name be blessed through all the ages. Amen." But neither Guy's gratitude for his escape nor the protection afforded by this attack sufficed to preserve his life when plague broke out again in Avignon twenty years later.

In discussing the surgical treatment of plague he quotes learnedly from Galen, Avicenna, and others of the Fathers, after the manner of the strictest sect of the physicians. But then forsaking these distractions of the imagination for the guidance of his own experience, he prescribes a course of treatment. His scattered directions, sorted out from much irrelevant matter, may conveniently be summarized as follows. He condemns the practices of opening hard buboes, and of excising the glands. In the first

place, the pain of the bubo is to be considered. This is to be relieved by moist heat in the form of wool soaked in warm oil, and the bubo later fomented with hot salt and water. If the buboes have not resolved, the next indication is to try to digest them and bring them to a head. To accomplish this end he advises the application of figs and onions cooked and rubbed up with butter and yeast; or flour, water and oil cooked together. When the buboes are mature, those in the groin and axilla should be opened in semilunar fashion, and those in the neck by a straight cut.

His general surgical principles apply here. The surgeon must be daring when on sure ground, but cautious in danger, and turn aside from false cures and practice. He must be gentle with the sick man, considerate to his friends, wise in his predictions. He must be chaste, sober, pitiful and merciful; not greedy, nor covetous of gold, so that he may receive a reasonable recompense according to the standing of the patient, the issue of the case, and his own dignity. But it appears that even these manifold virtues may go for nought, for, says Guy, there is a class of women and of idiots—a curious conjunction—who refer all their maladies to the Saints, reject human help, and rely on Divine intervention.

Guy de Chauliac does not say if general anæsthesia was used in his surgical operations in plague. Elsewhere in his book he describes the form of anæsthetic employed in his time, and the method of administration. A mixture was made of opium and the juice of nightshade, hyoscyamus, mandrake, ivy, hemlock and lettuce. In this a sponge was soaked and dried in the sun. When required for use the sponge is to be placed in hot water, and the fumes inhaled by the patient until he passes under their influence. Then the incision can be made without pain. After the operation, another sponge soaked in vinegar and applied to the nostrils will bring the patient to himself. So that, contrary to the popular belief, general anæsthesia as an aid to surgery was not a discovery of the nineteenth century.

I should like to refer back to one of Guy de Chauliac's statements, for this has been torn from its context and used to support the fantastic contention that the Black Death was an *epidemic* of pneumonic plague. He mentions blood-stained sputum as a common symptom during the first two months of the plague in Avignon, but not subsequently. In the oldest Latin text in the British Museum, the actual words are *sputum sanguinis*, of which I suppose "bloody sputum" would be the nearest equivalent. The French text, not the work of Guy's hand, and written in French of a later century, has *crachement de sang*, spitting of blood; while in modern English translations this has been strengthened still further to "coughing of blood" although there is no word of coughing in the original. *Sputum sanguinis*, although suggestive, is not conclusive of pneumonic plague, for bleeding from the mouth, and vomiting of blood, may occur in bubonic plague of great virulence. Indeed, in one Irish account of the Black Death,

vomiting of blood is given as a common sign. None the less, cases of pneumonic plague may well have been common at the beginning of the pestilence in Avignon. The winter season would favour the onset and spread of this form of the disease, and Guy de Chauliac says, too, that plague with *sputum sanguinis* was the most contagious, though statements of that age regarding the infectivity of any disease must be accepted with caution. But whatever the proportion of pneumonic plague in Avignon in January and February, it is quite clear that the disease in its main course there, as elsewhere, was bubonic in form. The contemporary evidence of this is overwhelming. But without labouring the matter

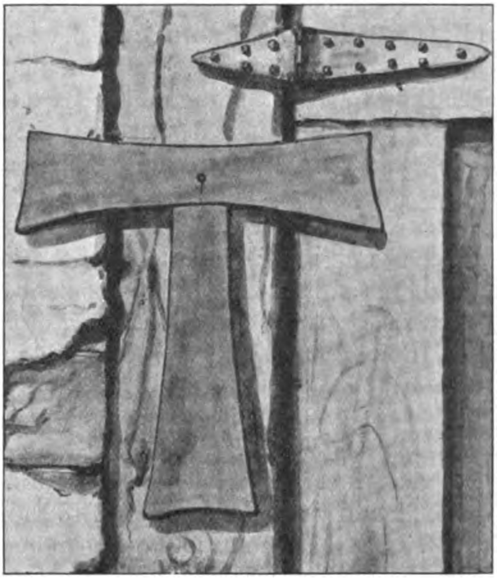

Fig. 1.—". . . cause to be fyxed upon the uttermost post of their Strete dore A certein Crosse of saynt Anthonye."—Plague Orders, 1547.

The illustrations were drawn by Major D. T. Richardson, M.C., Royal Army Medical Corps, from details supplied by the author.

further, the mere fact that Guy's account of the Black Death is a digression introduced into his chapter on swellings and their treatment, is conclusive in itself.

So far as we know, Thomas Vicary wrote nothing about plague or its treatment, but I think we may assume that in his plague practice he followed the wise precepts of Guy de Chauliac, for he held this old master in such reverence that in his will he left his copy of the *Chirurgia Magna* as a special bequest to the Hall of the Barber Surgeons Company. Thomas Vicary must have had an enormous experience of plague practice, for the disease was never absent from London throughout his whole

professional life. Always smouldering in some part of the City, it blazed up in epidemic degree every few years. Further, as surgeon to Henry VIII, Edward VI, Mary, and Elizabeth, he must have been personally concerned in some of the many plague panics in the royal households. In his journeyings through old London in these epidemic times, Thomas Vicary never saw houses marked with the red cross, for this famous sign of plague was not introduced for over thirty years after his death. The earliest emblem employed to indicate infected houses was a wisp of straw, and in 1518 it was laid down that the straw was to be hung at the end of a pole ten feet in length. Three years later a cross appears for the first time as a

FIG. 2.—"Write, 'Lord have mercy on us,' . . . they have the plague."—Shakespeare.

plague sign, but far different from the red cross of Pepys's day. In this year, 1521, plague-infected houses were ordered to be marked by "a sign of tau otherwise called St. Anthony's cross, set up openly upon his door, and to continue XL days" (fig. 1). These crosses were made of wood, and on July 3, 1563, we find the Court of Aldermen of the City ordering "CC blew hedless Crosses" to be prepared ready for issue. This estimate of the plague incidence fell far short of actuality, for three days later the Chamberlain is directed to "cause CC hedless blew crosses more to be made with sped, at the Cytyes charge." The additional crosses were provided with commendable despatch, for on July 8 it is reported that "Laurence Nasshe, bayle of fynnesbury, had this day blew crosses delivered unto him by the Courts here to be sett up there at fynnesbury, upon the uttermost

Postes of the Dores of suche howses there as are visited with the plage." What happened later as regards the provision of the blue headless crosses we do not know, for before long the Court adjourned, because "of the greate Daunger and perill of the sayde plague yet fyersly reygnynge." This was the great plague of 1563, when according to Stow the chronicler the dead were so numerous that they lay unburied about the streets, and when Queen Elizabeth, leaving London for fear of infection, in stern Tudor

FIG. 3.—"I did see . . . houses marked with a red cross upon the doors, and 'Lord have mercy upon us,' writ there."—Pepys's Diary.

fashion set up a gallows in the market-place of Windsor, to hang all such as should come there from London.

In the bitter religious controversies of the time the extreme reforming party came to regard a cross as something hardly respectable, and so, as a plague sign, it was superseded by a simple paper bill bearing the words, "Lord have mercy upon us." But this proved not to be distinctive enough, and as F. P. Wilson has shown, an addition was made in 1578, so that the emblem was now "a great red circle of the circuit of a foot and breadth of two inches, and the words, Lord have mercy upon us, printed in the midst" (fig. 2).

The red cross first appears during the great London plague of 1593.

The Plague Orders of 1603 direct that infected houses are to be indicated by "a red cross laid in oil colours to be made and painted over every such door of fourteen inches in length and the like in breadth upon the wall or boards in the most open place." Contemporary woodcuts show the cross painted in the middle of the door, and a paper with the words, "Lord have mercy upon us," fixed immediately above it (fig. 3). In 1608, the dimensions of the cross were changed to one foot by one foot. This was the final plague emblem, and it remained unaltered until the eventual extinction of plague in London.

Whatever the material employed for these plague signs from time to time, when once a house had been marked by a constable, no one under pain of heavy penalty might deface or remove the emblem. On the other hand, sometimes the dreaded cross was affixed to a house without authority. Wilson quotes from a contemporary source an amusing story regarding this. A certain constable, hearing a woman in a neighbouring house giving her husband a "sore lamming," set up a red cross on the door. The husband, highly incensed, complained to the Alderman of the Ward of the great hurt done him by this wrongful imputation of plague. The constable was haled before the Alderman and said in his defence, "May it please your worship, yesterday this man's wife beat him sore, so I set up a red cross, for I think there could be no worse plague in any house."

A new surgical era was ushered in by Ambroise Paré who, amongst other advances in the art, showed that hæmorrhage after amputation should be controlled by ligature of the vessels, and not by scalding with hot oil. Paré had a good conceit of himself. In the dedication of his "Surgery," dated February 8, 1579, and addressed to Henry III of France, he declares that his work is so complete that he has outdistanced Antiquity, and leaves little for Posterity to improve on. He writes at great length on plague, having had wide experience of the disease in the many French epidemics of his time. As a warning of impending plague he points out that wild animals may be seen flying from their haunts, while others are found dead, either in their burrows, or lying about the fields, killed, as he explains it, by the plague vapours fermenting in the ground. It is strange that this acute observer should omit rats from his quaint list of animals affected by plague, especially as they are mentioned by François Valleriole in his French treatise on plague published in 1566. Paré makes a more interesting omission, however, for he says nothing of those old experimentalists who, observing that persons recovered from plague were less likely to contract a second attack, actually went so far as to prepare from excised buboes what was in effect a crude plague vaccine. This they administered by the mouth to persons particularly exposed to infection, and they were persuaded that a high degree of protection was given thereby. The same primitive vaccine, similarly administered, was also used for the treatment of cases of plague.

Paré's symptomatic account of the disease is excellent, the best of his age that I have encountered. But to come more particularly to the domain

of the surgeon. He condemns routine bleeding in plague, but admits it to be a wise therapeutic when the veins are swollen, the face a fiery red, and the temporal arteries pulsate strongly. In such cases phlebotomy is performed according to the site of the bubo. If in the neck or in the arm-pit, then a vein in the arm of the affected side should be incised. But with a bubo in the groin the patient should be bled from the long saphenous vein, or any other suitable vessel above the foot, but always on the affected side. But even in these cases, he says, phlebotomy is useless unless carried out before the third day of the disease.

Amongst his prognostic signs he points out that it is a good and salutary sign if the bubo is red in colour and increases little by little; but if it is livid or black and comes very slowly to its just bigness, it is a deadly sign. Also it is a deadly sign if it increases suddenly with a swift violence. While buboes that are of a natural colour, and in all things like unto an œdematous tumour, suddenly bring the patient to destruction. I do not remember having seen this last type of bubo described in any of our modern textbooks. I have encountered one example of it in the case of a young European girl. She did not appear very ill, and so in the matter of prognosis the opinion of the twentieth century was at variance with that of the sixteenth. But Ambroise Paré was right, and the patient was dead within forty-eight hours.

As soon as the bubo appears a heated cupping-glass is to be applied in order to hasten either suppuration or resolution. At the same time a blistering fluid applied at some mete spot distal to the bubo is of great profit. Then foment the bubo with a large onion filled with treacle and certain herbs, roasted together and rubbed up with fat and yeast. Apply hot and change every six hours. But if the bubo is acutely inflamed with great pain from the beginning, instead of the foregoing, use cold poultices, such as leaves of henbane and sorrel cooked together and applied cold.

There must be no surgical interference with the bubo until it becomes ripe, else there may be great pain, fever, and divers accidents ending in gangrene. When it has come to a head open with a scalpel, or with a cautery, making a generous orifice lest venomous matter be retained. But if the bubo is malignant, as shown by a black or green colour, with consequent danger of mortification, scarify round the affected part, and treat with a variety of applications described as having the power to stop putrification; rightly so, for they are what we call to-day antiseptics. If, however, local gangrene supervenes in spite of this treatment, burn with the actual cautery, and cut away the crust down to the living flesh, and apply soothing antiseptics as before. And much more to the same purpose.

Plague carbuncles are to be fomented and treated on much the same lines as buboes. Paré says that he has seen carbuncles with a slough as large and broad as half the back; others going up from the shoulder to the throat, so deep that when the slough separated the carotid artery and windpipe were left bare. When he himself was attacked by plague, he

developed a carbuncle in the midst of the belly, so deep that when the slough had fallen away he could plainly see the peritoneum, and the scar that still remains is as broad as his hand. He points out, too, that carbuncles may also develop in the internal organs, and in this connexion proceeds to the following instructive narration. While he was surgeon of the Hospital of Paris, a young and strong monk of the Order of St. Victor, an overseer of the nursing staff, fell ill, and such was the vehemence and malignancy of the attack that he died on the third day. He was supposed to have been poisoned, and the governors of the hospital ordered a post-mortem examination to be made. This was carried out by Paré, assisted by a surgeon and a physician. They found the wall of the stomach shrunken, and deep in its substance "a print or impression as if it had been with a hot iron or potential Cautery with an Eschar or crust as broad as one's nail." All exclaimed with one voice that he had been poisoned with sublimate or with arsenic. "But behold, while I was sewing up his belly, I perceived many black spots dispersed diversely throughout the skin: then I asked my company what they thought of those spots? truly (said I) it seemeth unto me that they are like unto the Purple spots or tokens that are in the Pestilence. The Physician and the Surgeon denied it and said that they were the bitings of Fleas. But I persuaded them to consider the number of them over all the whole body, and also of their great depth and depression into the flesh; for when we had thrust Needles deep into the flesh in the midst of them, and so cut away the flesh about the needle, we found the flesh about the needle to be black." Also his symptoms, as credibly reported by the nurses, resembled those of plague. "We, persuaded by these proofs, revoked our former opinion and sentence, and made a Certificate to be sent unto the Governours and Masters of the Hospital, setting our hands and seals unto it to certifie them that he died of a pestilent Carbuncle."

I said that Ambroise Paré had a good conceit of himself. I think that his opinion was well founded.

If Paré's plague practice can be taken as representing the standard of his age, it would appear that plague patients then had a happier lot than that of their kind a century later. We cannot cite Daniel Defoe as a first-hand witness, for he passed through the London plague of 1665 only as a small child. Nevertheless, that there is some leaven of truth in his charges is amply proved by Boghurst and others. Doubtless most of the barbarities complained of were perpetrated by irregular practitioners, though the sufferings of the victims were not the less on that account. Defoe says: "The physicians and surgeons may be said to have tortured many poor creatures, even to death. The swellings in some grew hard, and they applied violent drawing plaisters, or poultices, to break them; and if these did not do, they cut and scarified them in a terrible manner," or "burnt them with caustics, so that many died raving mad with the torment, and some in the very operation. It often pierced my very soul to hear the groans and cries of them that were thus tormented."

In these old days the Barber Surgeons Company was much concerned with plague, not only through the professional activities of its members, but also in a corporate capacity. At times, the meetings of the Court, because "of the now greate visitation of the plague," were adjourned "till it shall please God to cease the Sickness." Once the Hall itself was marked with the red cross. The body of the clerk's child, dead of plague, had been carried through the gates, and in consequence the Lord Mayor ordered the premises to be quarantined for twenty-eight days. And following the great plague of 1625 there is a sad entry regarding "the fewnes of our Livery many of them being lately dead by reason of the late greate visitacon." All through these dreadful times there are entries which testify to the extraordinary generosity of the Company to all those with even the most slender claim to consideration; and to those, too, without any claim, other than the common one of sickness and distress. Sums equivalent to £15 to-day are paid out to plague victims; a widow whose house is visited receives £40 or £50; an election dinner is cancelled, and of the estimated cost, a part equivalent to some £80 is paid out to poor persons visited with the plague. And so the noble record continues.

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The City, too, made provision for the wife of any surgeon in its employment who died as a result of his plague duty. The Plague Orders of 1630 ordained that such widows would receive half the amount of the surgeon's stipend for life. The pension was increased by the Orders of 1636 to the whole sum of the late husband's pay, and this regulation remained unaltered until the end of plague in London. What would these pensions have amounted to? It is recorded on July 4, 1625, that the Lord Mayor on his

own authority, duly confirmed and ratified by the Aldermen, had fixed the pay of a surgeon to the pesthouse at £30 (say, £450) per annum, the surgeon "to abide att ye Pesthouse for the cure of those sent thether visited." At the same time the Lord Mayor arranged with "Master Heath, Surgion," "for Fiftie pounds per Annum [say, £7-800] to doe" his "best endevours for the curinge of all the poore infected with the Plague, for nothing; and of the better sort infected, for some reasonable recompense." The wording of the minute shows that Master Heath was a surgeon of note, and well-known to the Court of Aldermen. I have no doubt, therefore, that he was Nathaniel Heath, a Warden of the Company, whose name was engraved on the façade of their anatomical theatre, and who was one of those chosen to ride with Charles I on the occasion of a State entry, and directed to appear "well mounted on horseback, in plush or Velvett, with chains of gold."

Although it was laid down that the surgeons to the pesthouse should abide there, there is evidence that these officers could be called on to decide the diagnosis in difficult or important cases elsewhere. By reason of his pronouncement in one such during the plague of 1665, Nathaniel Upton joined the company of the immortals. In an address delivered elsewhere, I dealt with this matter, but it may be new to some here, and moreover illustrates the point under discussion. On June 10, 1665—about two months before the wave of plague advancing slowly from the Drury Lane district had swamped the City—one isolated death from plague occurred in Fenchurch Street, as may still be read in the Bill of Mortality. This death struck terror to Samuel Pepys, living in Sething Lane close by, and is duly noted in his diary. The victim was the manservant of Dr. Burnet, Pepys's friend and family physician, and as transpires later, Nathaniel Upton examined the body and certified the cause of death. Pepys records that when plague was diagnosed, Burnet quarantined his house immediately without waiting for any official action, which, he adds, "is very handsome." It is strange that the diarist who so delighted in unusual happenings should have missed the chance of recording the sequel, but he makes no further mention of the affair except to note Dr. Burnet's own death from plague some ten weeks later. This is what happened. Burnet's haste in shutting up his house suggested to malicious persons that he had something to hide, and a story was put about that the servant had not died of plague but had been murdered by his master; and this was soon embellished by the allegation that the doctor had been arrested and committed to Newgate on a charge of murder. The story gained so wide a currency and credence that Burnet in self defence prepared a "Vindication" which he posted in the Royal Exchange, and also published in two news-sheets, from which I quote. It ran as follows:—

"*Whereas some person or persons have maliciously forged and published that abominable falshood, viz. That I* Alexander Burnet of *St.* Gabriel, Fen-Church, London, *Doctor in Physick, did kill my Servant* William

Passon, *and was committed to* New-Gate *for it*; *I do by these presents upon the* Royal Exchange, London, *post him or them for* Forgery, *who have invented and vented that wicked Report*: *It being declared under the Hand and Seal of* Mr. Nathaniel Upton, *Master of the Pesthouse*, London, *who searched the Body of the said* William Passon, *that he dyed of the* Plague, *and had a* Pestilential Bubo *in his* Right Groin, *and two* Blanes *in his* Right Thigh.

"*July* 14. 1665. ALEX. BURNET. M.D."

Of the English surgeons of the seventeenth century who wrote on plague, I suppose the best remembered to-day is John Woodall. He practised his surgical art in the great London plagues of 1603, 1625 and 1636, as well as in epidemics in France, Germany, and Poland. He himself passed through two attacks of the disease.

The clinical section of his treatise is good on the whole, in parts excellent, for he describes the form of plague that affects the throat, which even in our time has been mistaken for diphtheria and for malignant angina. But he does not differentiate typhus fever, and septicæmic plague with tokens, in the clear fashion of Boghurst. He goes wide of the mark in recommending preventives of plague. Sulphur fumigation he condemns utterly, and this for the very reason that makes it of some effect. Anyone can see for himself, he argues, that sulphur fumigation kills, with other insects, fleas; therefore it must be most injurious to the occupants of the fumigated house, and so he will have none of it.

Unfortunately he is in such haste to extol the miraculous virtues of his own secret cure for the malady that he does not stop to discuss his surgical procedure, which, whatever it may have been, was based on an enormous experience. He gives most precise directions for the administration of his remedy, but beyond saying that the pills contain gold he is careful to keep their composition secret. One single dose, he declares, will cure plague, even plague with tokens, and is no less effective for the ague, whether quotidian, tertian, quartan, or irregular. His printed testimonials make amusing reading. With disarming naïveté he explains that in publishing these he is only obeying the injunctions of the Scriptures. The servant in the parable who hid his talent in the earth fell under the divine condemnation; so, too, Our Lord declared that a lighted candle should not be hidden under a bushel, but set on a candlestick to give light unto men. (Perhaps some medical delinquent of to-day, charged with advertising, will recite passages of Scripture, and confound the General Medical Council.) One of these testimonials is too delightful to be forgotten. It is addressed to the Privy Council by the minister, churchwardens and magistrates of St. Margaret's, Westminster, and is as follows: "Wee the inhabitants of the Parish of S. Margaret's in Westminster, whose names are here under written, doe most humbly certifie your Lordships, and that upon our owne

knowledge, that in this time of visitation of the PLAGUE, Feavers, Agues, and other diseases, which have beene very grievous and great afflictions unto us: It pleased Almighty God, by the hands of one *John Woodall*, Chirurgion of the East-*India* Company, and of his Majesties Hospitall of Saint *Bartholomewes*, in *London*, a learned, judicall, and expert man, which said *Iohn Woodall*, about five weekes before *Michaelmas* last, delivered unto some of us, who were Officers in this said Parish, an *Antidote* composed in Pills, which hee had made up, with directions how they should be administred to such as had the Plague, Feavers, Agues, or any such violent diseases, that then remained amongst us; which said Pills have beene imployed very carefully, according to his said directions, and administred to three score severall persons, some of this new Feavour, some of the small Poxe, some Agues, and some other Diseases, but most of them that were visited with the PLAGUE, which had Risings, Soares, Carbuncles, Blaines, and were certainely knowne to have that fearefull disease, all which Persons recovered, and not one of all them that hath taken the said Pills, dyed (thankes be given to Almighty God) neither can we doe lesse, then [*sic*] publish the great skill, judgement, and charity of the said *Iohn Woodall*, by whose industry and care, this Antidote hath wrought so good effect, and did bestow them freely, without one penny of recompence for the same."

An early example of the manufacturer's free sample! The date of the testimonial, October 6, 1638, tells us that the high recovery rate usual at the end of an epidemic period had been credited to treatment. So that even in this popular practice of to-day we were forestalled by our ancestors.

In this brief journey back into the past, I have tried to show you these men of old time, who in their strivings caught sight of truth, often through a glass darkly, but at times with a clear vision; and when in their ancient writings we find knowledge that has been vaunted an acquisition and adornment of our own age, we stand staring, incredulous, feeling as if we had seen one risen from the dead.

In his lifetime Thomas Vicary strove to unite the contending guilds of the Barbers and the Surgeons in one corporate whole. The union was accomplished, and the resulting Mystery and Commonaltie persisted for two centuries, then to fall asunder once more. But to-night, if only for the space of one hour, the Worshipful Company and the Royal College have again come into union, brought together by the virtue of the pious and enduring memory of "that excellent chirurgion, Master Thomas Vicary."

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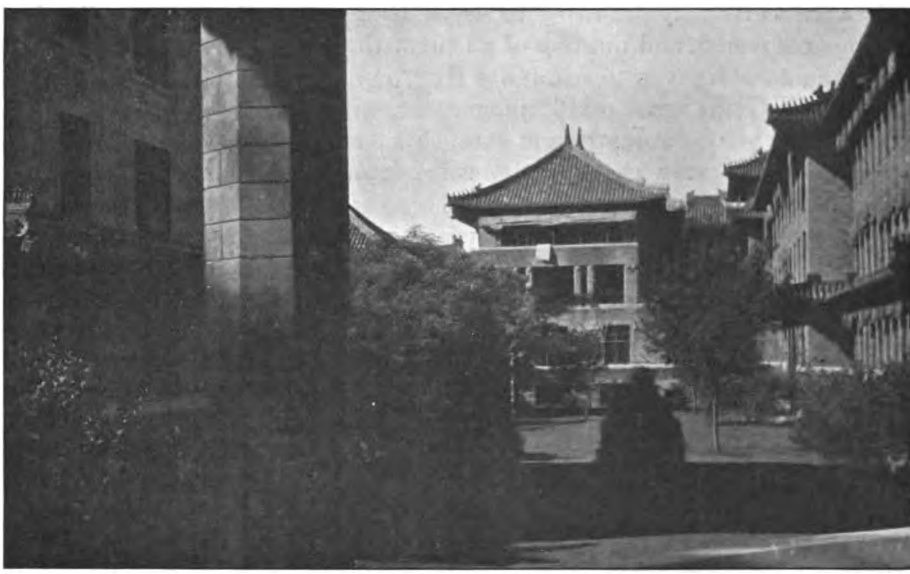
SOME IMPRESSIONS OF GENERAL SURGERY AT THE PEKING UNION MEDICAL COLLEGE HOSPITAL.

By Captain D. ETTLES.
Royal Army Medical Corps.

Situated in the heart of the ancient capital of China, the Peking Union Medical College Hospital occupies a unique position. Built and equipped on a lavish scale by Rockefeller in 1919, it presents the picture of one of the most modern and up-to-date hospitals in the world, surrounded by conditions of sanitation and housing which may be described as little more



General view of the hospital grounds showing the pagoda style of architecture.

than primitive. Approximately 350 beds are available. I was privileged to visit the surgical service daily for two months and venture to give some impressions of the surgical work carried out in this great hospital. I make no claim to originality, but merely give, under a series of headings, what struck me as new, or unusual, in the teaching and treatment of surgery on the latest American lines as applied in China.

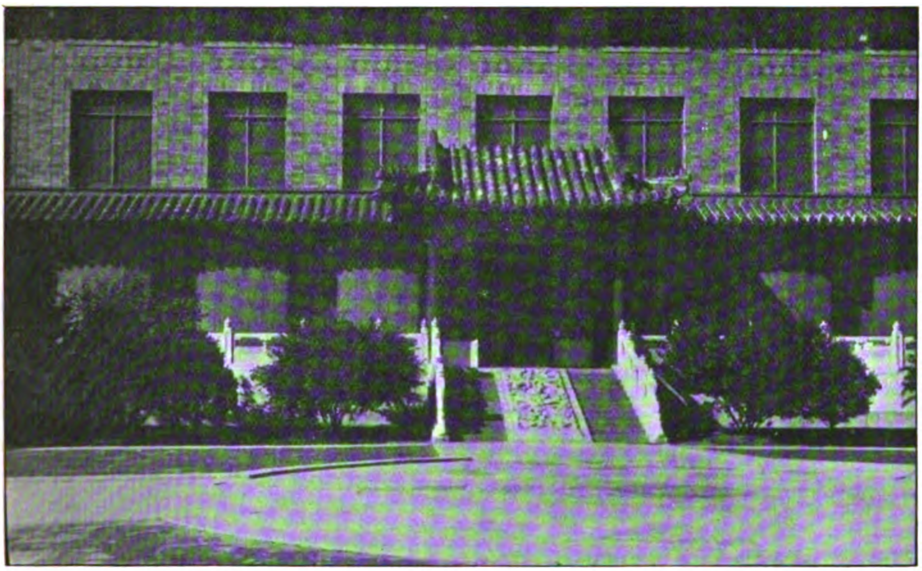
Team Work.

The senior Chinese house staff remain in residence for several years, so that an excellent standard of team work is possible. All assistance at operations is given by the house staff, and the general theatre technique is

of a very high standard, although the students do not appear to get any experience of actually assisting at operations.

Anæsthesia.

Spinals and locals are used in the great majority of cases, nerve blocks also being popular. It is rare to see a general anæsthetic given, except to supplement local or spinal anæsthesia when gas and oxygen are used. Having been taught in the conservative school of medicine, the wholesale use of spinal anæsthesia for abdominal surgery was interesting. The relaxation of the abdominal wall obtained by four cubic centimetres of six per cent novocain intrathecally was a joy to appreciate, and all amputations were carried out under spinals or nerve block. The anæsthesia was not



One entrance to the hospital.

a success in every case. One hernia case vomited so persistently that the abdominal wall had to be repaired three times in one sitting before the defect in the inguinal canal had been closed. A case of appendicectomy vomited just as the appendix was being removed; some anxious moments were spent as attempts were made to invaginate the stump of the acutely inflamed organ. Several patients complained of pain throughout the operation, but it is only fair to point out that such cases were far more common among the sensitive Russians than among the more philosophical and stoical Chinese. Indeed, the Chinese seem to have a much greater ability to withstand pain than the white races, once they have made up

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The City, too, made provision for the wife of any surgeon in its employment who died as a result of his plague duty. The Plague Orders of 1630 ordained that such widows would receive half the amount of the surgeon's stipend for life. The pension was increased by the Orders of 1636 to the whole sum of the late husband's pay, and this regulation remained unaltered until the end of plague in London. What would these pensions have amounted to? It is recorded on July 4, 1625, that the Lord Mayor on his

own authority, duly confirmed and ratified by the Aldermen, had fixed the pay of a surgeon to the pesthouse at £30 (say, £450) per annum, the surgeon "to abide att ye Pesthouse for the cure of those sent thether visited." At the same time the Lord Mayor arranged with "Master Heath, Surgion," "for Fiftie pounds per Annum [say, £7-800] to doe" his "best endevours for the curinge of all the poore infected with the Plague, for nothing; and of the better sort infected, for some reasonable recompense." The wording of the minute shows that Master Heath was a surgeon of note, and well-known to the Court of Aldermen. I have no doubt, therefore, that he was Nathaniel Heath, a Warden of the Company, whose name was engraved on the façade of their anatomical theatre, and who was one of those chosen to ride with Charles I on the occasion of a State entry, and directed to appear "well mounted on horseback, in plush or Velvett, with chains of gold."

Although it was laid down that the surgeons to the pesthouse should abide there, there is evidence that these officers could be called on to decide the diagnosis in difficult or important cases elsewhere. By reason of his pronouncement in one such during the plague of 1665, Nathaniel Upton joined the company of the immortals. In an address delivered elsewhere, I dealt with this matter, but it may be new to some here, and moreover illustrates the point under discussion. On June 10, 1665—about two months before the wave of plague advancing slowly from the Drury Lane district had swamped the City—one isolated death from plague occurred in Fenchurch Street, as may still be read in the Bill of Mortality. This death struck terror to Samuel Pepys, living in Sething Lane close by, and is duly noted in his diary. The victim was the manservant of Dr. Burnet, Pepys's friend and family physician, and as transpires later, Nathaniel Upton examined the body and certified the cause of death. Pepys records that when plague was diagnosed, Burnet quarantined his house immediately without waiting for any official action, which, he adds, "is very handsome." It is strange that the diarist who so delighted in unusual happenings should have missed the chance of recording the sequel, but he makes no further mention of the affair except to note Dr. Burnet's own death from plague some ten weeks later. This is what happened. Burnet's haste in shutting up his house suggested to malicious persons that he had something to hide, and a story was put about that the servant had not died of plague but had been murdered by his master; and this was soon embellished by the allegation that the doctor had been arrested and committed to Newgate on a charge of murder. The story gained so wide a currency and credence that Burnet in self defence prepared a "Vindication" which he posted in the Royal Exchange, and also published in two news-sheets, from which I quote. It ran as follows:—

"*Whereas some person or persons have maliciously forged and published that abominable falshood, viz. That I* Alexander Burnet of *St.* Gabriel, Fen-Church, London, *Doctor in Physick, did kill my Servant* William

Passon, *and was committed to* New-Gate *for it*; *I do by these presents upon the* Royal Exchange, London, *post him or them for* Forgery, *who have invented and vented that wicked Report*: *It being declared under the Hand and Seal of* Mr. Nathaniel Upton, *Master of the Pesthouse*, London, *who searched the Body of the said* William Passon, *that he dyed of the* Plague, *and had a* Pestilential Bubo *in his* Right Groin, *and two* Blanes *in his* Right Thigh.

"*July* 14. 1665. ALEX. BURNET. M.D."

Of the English surgeons of the seventeenth century who wrote on plague, I suppose the best remembered to-day is John Woodall. He practised his surgical art in the great London plagues of 1603, 1625 and 1636, as well as in epidemics in France, Germany, and Poland. He himself passed through two attacks of the disease.

The clinical section of his treatise is good on the whole, in parts excellent, for he describes the form of plague that affects the throat, which even in our time has been mistaken for diphtheria and for malignant angina. But he does not differentiate typhus fever, and septicæmic plague with tokens, in the clear fashion of Boghurst. He goes wide of the mark in recommending preventives of plague. Sulphur fumigation he condemns utterly, and this for the very reason that makes it of some effect. Anyone can see for himself, he argues, that sulphur fumigation kills, with other insects, fleas; therefore it must be most injurious to the occupants of the fumigated house, and so he will have none of it.

Unfortunately he is in such haste to extol the miraculous virtues of his own secret cure for the malady that he does not stop to discuss his surgical procedure, which, whatever it may have been, was based on an enormous experience. He gives most precise directions for the administration of his remedy, but beyond saying that the pills contain gold he is careful to keep their composition secret. One single dose, he declares, will cure plague, even plague with tokens, and is no less effective for the ague, whether quotidian, tertian, quartan, or irregular. His printed testimonials make amusing reading. With disarming naïveté he explains that in publishing these he is only obeying the injunctions of the Scriptures. The servant in the parable who hid his talent in the earth fell under the divine condemnation; so, too, Our Lord declared that a lighted candle should not be hidden under a bushel, but set on a candlestick to give light unto men. (Perhaps some medical delinquent of to-day, charged with advertising, will recite passages of Scripture, and confound the General Medical Council.) One of these testimonials is too delightful to be forgotten. It is addressed to the Privy Council by the minister, churchwardens and magistrates of St. Margaret's, Westminster, and is as follows: "Wee the inhabitants of the Parish of S. Margaret's in Westminster, whose names are here under written, doe most humbly certifie your Lordships, and that upon our owne

knowledge, that in this time of visitation of the PLAGUE, Feavers, Agues, and other diseases, which have beene very grievous and great afflictions unto us: It pleased Almighty God, by the hands of one *John Woodall*, Chirurgion of the East-*India* Company, and of his Majesties Hospitall of Saint *Bartholomewes*, in *London*, a learned, judicall, and expert man, which said *Iohn Woodall*, about five weekes before *Michaelmas* last, delivered unto some of us, who were Officers in this said Parish, an *Antidote* composed in Pills, which hee had made up, with directions how they should be administred to such as had the Plague, Feavers, Agues, or any such violent diseases, that then remained amongst us; which said Pills have beene imployed very carefully, according to his said directions, and administred to three score severall persons, some of this new Feavour, some of the small Poxe, some Agues, and some other Diseases, but most of them that were visited with the PLAGUE, which had Risings, Soares, Carbuncles, Blaines, and were certainely knowne to have that fearefull disease, all which Persons recovered, and not one of all them that hath taken the said Pills, dyed (thankes be given to Almighty God) neither can we doe lesse, then [*sic*] publish the great skill, judgement, and charity of the said *Iohn Woodall*, by whose industry and care, this Antidote hath wrought so good effect, and did bestow them freely, without one penny of recompence for the same."

An early example of the manufacturer's free sample! The date of the testimonial, October 6, 1638, tells us that the high recovery rate usual at the end of an epidemic period had been credited to treatment. So that even in this popular practice of to-day we were forestalled by our ancestors.

In this brief journey back into the past, I have tried to show you these men of old time, who in their strivings caught sight of truth, often through a glass darkly, but at times with a clear vision; and when in their ancient writings we find knowledge that has been vaunted an acquisition and adornment of our own age, we stand staring, incredulous, feeling as if we had seen one risen from the dead.

In his lifetime Thomas Vicary strove to unite the contending guilds of the Barbers and the Surgeons in one corporate whole. The union was accomplished, and the resulting Mystery and Commonaltie persisted for two centuries, then to fall asunder once more. But to-night, if only for the space of one hour, the Worshipful Company and the Royal College have again come into union, brought together by the virtue of the pious and enduring memory of "that excellent chirurgion, Master Thomas Vicary."

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SOME IMPRESSIONS OF GENERAL SURGERY AT THE PEKING UNION MEDICAL COLLEGE HOSPITAL.

By Captain D. ETTLES.
Royal Army Medical Corps.

Situated in the heart of the ancient capital of China, the Peking Union Medical College Hospital occupies a unique position. Built and equipped on a lavish scale by Rockefeller in 1919, it presents the picture of one of the most modern and up-to-date hospitals in the world, surrounded by conditions of sanitation and housing which may be described as little more

General view of the hospital grounds showing the pagoda style of architecture.

than primitive. Approximately 350 beds are available. I was privileged to visit the surgical service daily for two months and venture to give some impressions of the surgical work carried out in this great hospital. I make no claim to originality, but merely give, under a series of headings, what struck me as new, or unusual, in the teaching and treatment of surgery on the latest American lines as applied in China.

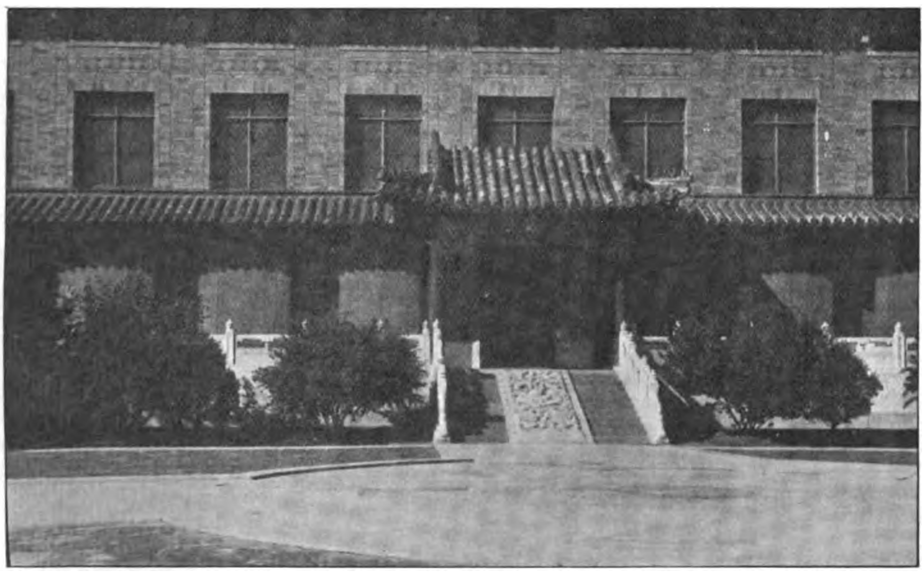
Team Work.

The senior Chinese house staff remain in residence for several years, so that an excellent standard of team work is possible. All assistance at operations is given by the house staff, and the general theatre technique is

of a very high standard, although the students do not appear to get any experience of actually assisting at operations.

ANÆSTHESIA.

Spinals and locals are used in the great majority of cases, nerve blocks also being popular. It is rare to see a general anæsthetic given, except to supplement local or spinal anæsthesia when gas and oxygen are used. Having been taught in the conservative school of medicine, the wholesale use of spinal anæsthesia for abdominal surgery was interesting. The relaxation of the abdominal wall obtained by four cubic centimetres of six per cent novocain intrathecally was a joy to appreciate, and all amputations were carried out under spinals or nerve block. The anæsthesia was not



One entrance to the hospital.

a success in every case. One hernia case vomited so persistently that the abdominal wall had to be repaired three times in one sitting before the defect in the inguinal canal had been closed. A case of appendicectomy vomited just as the appendix was being removed; some anxious moments were spent as attempts were made to invaginate the stump of the acutely inflamed organ. Several patients complained of pain throughout the operation, but it is only fair to point out that such cases were far more common among the sensitive Russians than among the more philosophical and stoical Chinese. Indeed, the Chinese seem to have a much greater ability to withstand pain than the white races, once they have made up

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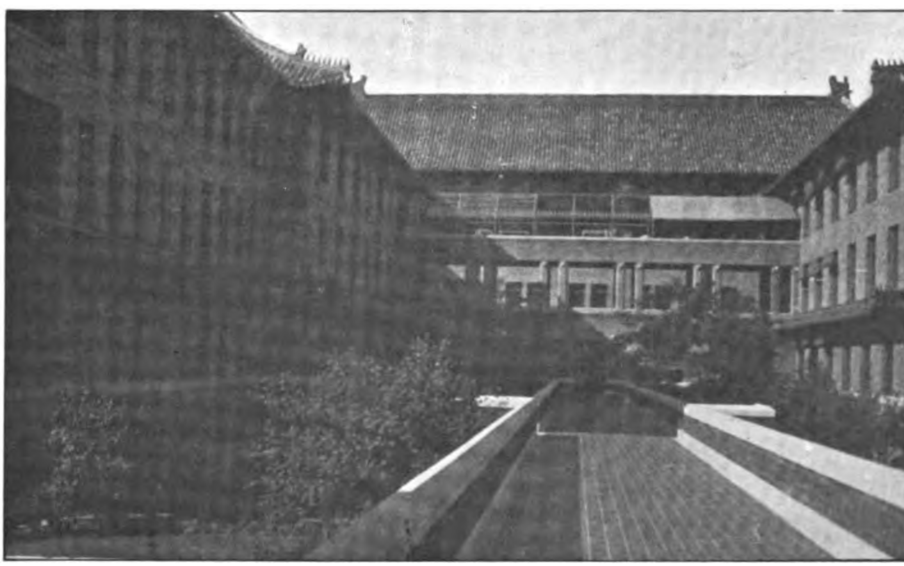
their minds that an operation is unavoidable. On the whole, the post-operative course of most cases seemed remarkably smooth.

Preparation of the Skin.

Mercurochrome is used for routine sterilization of the skin. It is claimed that reactions and rashes do not occur, but the mercurochrome is difficult to remove and has to wear away. The red colour takes some time to disappear and makes rather a mess of theatre towels. Its advantage is its absolute non-toxicity.

Skin-Grafting.

Many cases of chronic varicose ulcer are seen. Some of these ulcers also occur on the abdominal wall and form a special group of a painful, necrotic, spreading lesion, associated with morphinism, which is widespread.



The surgical block. The walls are of grey stone and the roofs of green tiles.

These cases are treated as out-patients until they are moderately clean, when they are admitted for skin-grafting by Reverdin's method. Until recently I was under the impression that the use of Reverdin grafts was limited to replies in examination papers, but the results of pinch-grafting these ulcers are most satisfactory. The grafts are taken from the front of the thigh and sewn on the surface of the clean ulcer. The majority of the grafts take, and the rapid growth of each little epithelializing colony is striking.

After radical excision of the breast for carcinoma, should there be any difficulty in approximating the skin edges, no effort is made to do so by

tension. The edges of the wound are sewn down to the chest wall all round and Tiersch grafts applied to the remaining raw surface.

Chest Surgery.

(1) *Empyema.*—Meta-pneumonic empyemata are treated by open drainage, a very large flanged tube being used. This tube is much larger than that usually employed, and is of sufficient calibre to admit the tip of the index finger. In dealing with children such a large tube may require the removal of portions of at least two ribs. The use of the large tube has so far been justified by the high percentage of primary closures obtained. In China, secondary infection is so common and persistent that primary healing is of paramount importance.

Chronic empyemata are commonly seen in north China, where the dust-laden air causes a huge number of secondary infections. Thoracoplasty on the lines of the Sauerbruch paravertebral technique is employed for some cases, paravertebral nerve-block anæsthesia being employed. At present the technique employed is on the basis of the old unroofing operation of Schede, attempts being made to saucerize the cavity so as to leave no pockets. The final result seems to be a little better with the Schede technique, although the cavity remaining after the operation may be relatively huge. The cavity is packed with vaseline gauze.

(2) *Tuberculosis.*—Many cases of chronic pulmonary tuberculosis are seen which are ideal for phrenic avulsion, or thoracoplasty, but the necessary after-treatment in sanatoria is at present unknown in China.

The treatment of cold abscess of the ribs is unusual, this common lesion being treated on the lines of a benign tumour. The incision is made wide of the swelling, and the dissection carried out so that the abscess cavity is not opened but removed, with the diseased portion of the rib, in one piece. Great care is taken that all tracks are identified, followed up, and freely opened. The resultant cavity is again a formidable affair and is packed with vaseline gauze.

(3) *Anæsthesia.*—Intratracheal anæsthesia does not seem to be popular here. I never saw the method employed. Paravertebral block supplemented by ether is the method generally employed.

Gunshot Wounds.

A fair number of gunshot wounds are seen. The constant wars in China result in the steady influx of cases, mostly in a very bad state owing to lack of transport.

Amputations.

These are common. A huge number of chronic suppurating, tuberculous joints are seen which are beyond all hope of conservative treatment. The difficulties of after-treatment have already been mentioned. These cases are in conformity with the clinical picture of most surgical disease as

seen in China, where the gross lesion is seen a great deal more often than it is at home.

Cerebral Surgery.

Ventriculography is commonly used for diagnostic purposes. I saw one case of trigeminal neuralgia operated upon under local anæsthesia. The deep dissection exposing the middle meningeal artery in the foramen spinosum and the Gasserian ganglion in the cave of Retzius was greatly facilitated by the use of a light-carrying retractor.

Injection treatment for trigeminal neuralgia does not seem popular.

Abdominal Surgery.

(1) *Anæsthesia.*—All abdominal cases are operated on under local anæsthesia. Something has already been mentioned on this subject.

(2) *Incisions.*—Transverse incisions are not used.

(3) *The Sucker.*—Each operating theatre has a sucker attachment which can be used at any moment. I saw the sucker in use during abdominal, chest and cerebral surgery, and was most impressed by its value as a permanent fitting. The nozzle of the sucker is sterilized and ready on the instrument table for every case. This nozzle can be passed into the paracolic gutters and amongst coils of intestine with the minimum of disturbance. The action is far more gentle than that of the usual gauze roll. In one case of perforated gastric ulcer the free fluid in the peritoneal cavity was removed neatly and efficiently in a way which would have been quite impossible with a gauze pack. Further, it renders the insertion of large abdominal sponges into the abdominal cavity almost unnecessary. In a case of nephrectomy there was severe hæmorrhage from the pedicle, owing to the premature removal of the clamp forceps when the ligature was tied. The sucker was of the greatest value in allowing a clear field in which to catch the bleeding vessel in a way which would have been impossible with the usual method of mopping out with large sponges.

Blood Transfusion.

Many cases of post-partum hæmorrhage are brought in which require immediate transfusion and the technique which is employed is complicated. The veins of recipient and donor are exposed and needles tied in. The blood is transported from one to the other in a series of 50 c.c. syringes. These syringes are sterilized in citrate solution but are used dry. One nurse takes the blood and another transports it to the resident houseman, who introduces it. Should there be any delay, saline is gently run in to keep the lumen of the veins patent. I saw this system in use on several occasions, but I do not consider it has any advantage over the more simple citrate method usually employed. A syringe technique was tried out in Guy's Hospital in 1927, but it was, I think, soon abandoned in favour of the old citrate method. About twenty syringes are employed, so that each

syringe is only used once and then removed from the theatre. Having had some experience of a similar technique in China and having seen it tried out again, I am convinced that the citrate technique is more simple and foolproof.

Orthopædics.

The standard of plaster work is very high. Whitmans' method is used for fractures of the neck of the femur, the Thompson modification being substituted when the former method cannot be retained. Cases of acute osteomyelitis are treated by the method of Winnett Orr. The results seem most encouraging. The plastering over of the exposed bony cavity is of great value in preventing secondary infection which is so prevalent in the dust-laden air of this country.

Local anæsthesia seemed of the greatest value in such cases as the division of adhesions in the fingers and hand as the result of burns. The co-operation of the patient in demonstrating the effect of division of the adhesions was most effective.

Transfixion pins are used extensively for fractures. There seems to be no doubt that extension by pin traction is the method of choice for most severe fractures of the long bones.

The treatment of certain diseases—cancrum oris, endarteritis obliterans, and hæmophilia—will now be mentioned as being unusual, or contrary to the common textbook teaching.

Cancrum Oris.

This is quite a common infection. Its occurrence is almost pathognomonic of associated leishmaniasis (kala-azar). Treatment is carried out on the lines of multiple small transfusions. Very little is done locally. The old fuming acid treatment advocated in most textbooks has been discarded, as the results were universally fatal and the necrosis went on spreading rapidly. Treatment is constitutional rather than local.

Endarteritis Obliterans.

Cases of this disease are common, especially amongst the Russians. Treatment is carried out on the lines of prolonged rest in bed, weekly injections of T.A.B. on the theory of protein shock, and magnesium sulphate introduced intravenously to try to restore the elasticity of the vessel walls. The objection to these methods is the time factor, for the pain of the arterial spasm seems to be associated with insanity and something more radical has to be done to prevent such a change. Practically all cases come to amputation in the end, but many go on for several years with a useful limb when treated on conservative lines, although actual gangrene may have been present on admission. Leriches' peri-arterial sympathectomy has been abandoned at the moment. Careful records are made of the surface temperatures after the induction of spinal anæsthesia.

Should there be any improvement after removal of the spastic element, sympathetic ramisectomy is considered.

HÆMOPHILIA.

Ovarian extract is being tried out to control the hæmorrhages of hæmophilia. The basis of the treatment rests on recent work carried out in America on guinea-pigs. It was found that "bleeders" lacked a certain female ferment. One case treated here stopped bleeding after a hypodermic injection of ovarian extract. Twelve hours later the bleeding recommenced, but was again checked by the use of ovarian extract. This particular case showed a very rare condition of Volkmann's paralysis following a hæmorrhage into the ante-cubital fossa resulting from a bruise. I understand that only one other similar case has been recorded in the literature. Further work is being done here on these lines.

Two other points are of interest: a new technique for X-ray examination of the liver and spleen and the question of autopsy.

X-RAY OF THE LIVER AND SPLEEN.

A new German method is on trial for the demonstration of the liver and spleen by X-ray, using a solution of "Thorotrast." This solution is an emulsion of thorium dioxide in oil and is injected intravenously. The cells of the reticulo-endothelial system absorb the oil and the thorium shows as a shadow on the film. No toxic symptoms have yet been observed. The dosage is calculated on the principle of one cubic centimetre per kilo of body weight, the injections being given once daily for four days. The calculated dose is distributed evenly throughout the four injections. The solution is expensive, each examination requiring about 25s. worth of solution. Some photographs in the German literature show convincing studies of the liver and spleen with secondary metastases appearing as clear areas in the general shadow. This method may be of great value when it has been perfected, and the field of application is a large one. Some experiments carried out on rabbits here, using the requisite dose, suggest that the method is sound, the liver and spleen showing clearly in the skiagram.

AUTOPSY.

Chinese religious practices do not allow any mutilation of the body after death, and it is difficult to persuade the very superstitious Chinese to allow a post-mortem. Many specimens are lost, as after great persuasion only about fifty per cent of deaths come to autopsy.

The surgical teaching round is on Thursday, when all cases are reviewed and discussed. I venture to give one or two impressions of these rounds.

First, the value placed on laboratory reports seems rather out of

proportion to the clinical examination. Pneumonias are X-rayed and the film causes more discussion than the pulse-rate. Bronchoscopy was advocated for several cases of post-operative pneumonia, a form of treatment which would be regarded as rather drastic by the more conservative English school. I was left with the idea that one's sense of proportion was being lost in a mass of laboratory figures but, on the other hand, one can imagine the caustic comments of our forefathers when the new school of medicine started to listen to the heart with a stethoscope.

Second, the surgical unit is most progressive. The latest literature is eagerly absorbed and new methods are tried out at the earliest opportunity. The industry of the Chinese is truly astonishing. All of them read and speak English, and some also read German easily. A high standard of English is required before admission to the College.

Third, the manual dexterity of the Chinese is very high. They are neat and quick and have a remarkable ability to get a needle into very poor veins.

Fourth, anyone who has been brought up in the atmosphere of our voluntary hospitals at home would be amazed at the general impression of plenty of money. There seems to be absolutely no limit to the expenditure on equipment, instruments, ward fittings, etc. I understand there is a yearly budget, but the margin for extra expenditure under the Rockefeller benefit must be a very generous one. It is a remarkable thing to go into a private room fitted with every comfort and find an almost inarticulate coolie occupying quarters which would cost about £20 a week in a London nursing home. Any instrument which may be required is obtained without difficulty, regardless of expense. I understand that the staff required to run the hospital is approximately 1,000. It is a little disappointing to think of the hospitals at home struggling along in a financial morass, and to see this hospital run on such a lavish scale, where expense seems absolutely no object.

Under these scattered headings I have attempted to give some of the methods I have seen. To anyone who is fortunate enough to visit this city, a tour of the hospital will be more than repaid. He will carry away the memory of first-class work in one of the show hospitals of the world.

THE DOCTOR'S WAR.

By D.A.D.M.S.

Part II.

(*Continued from p.* 274.)

In my new job I came in contact with our allies, the French, and Italians and with Greeks. It was part of my work to preside at a monthly Inter-Allied Sanitary Congress. The health of Constantinople and its environs was in our charge. At each 'meeting two Turkish doctors attended; they represented the Turkish Health Services. We also had to administer the system of examination, disinfection, and segregation or quarantine of ships, crews and passengers coming from Black Sea ports. As cholera, typhus or plague was always present on some point of the Black Sea littoral, important and urgent questions frequently arose. At that time typhus from Russia and plague in Constantinople were the uppermost.

Denikin's army had definitely broken now and the streets of Constantinople were full of its remnants. Russian officers wandered up and down the Rue de Pera. The better-off sat in the hotel lounges and smoked and drank queer drinks. The worse-off sold the clothes off their backs, asked for work, even begged in the street. The still rich ones lived in Prinkipo, that jewel of an island in the Sea of Marmora. There they dined, wined, gambled and bathed as long as the money lasted. One could not but marvel how indifferent they were to their poorer brethren wandering about Constantinople.

The Yacht Club at Prinkipo was turned into a convalescent home for officers. A beautiful building on the sea-front, luxuriously furnished and fitted. A medical officer was put in charge as house governor, and the place proved a great boon to all officers in the Army of Occupation. A service of ferry steamers plied to and from Constantinople to Prinkipo; very old paddle-boats they were and none too safe when seas ran high. The captain of one boat assured me it would not take much of a bump in bad weather to break the boat in two.

In a few months the Allied Corps was absorbed into G.H.Q. and my temporary job was finished. I was next posted to command a large hospital for victims of Venus. Not a pleasant job. Some 1,500 soldiers incapacitated by venereal disease, but not sick men. It was so terribly hard to keep them interested and amused. They grew restless and depressed and gave a good deal of trouble at times. The site of the hospital was close to an immense wireless plant put up by the Germans—a towering mass of tall standards and wire. As the winter approached and it got colder and colder flights of duck would

pass over and the staff of the wireless station were accustomed to pick up a few dead wild duck each morning, killed by flying against the wire struts. It became pretty plain that the outskirts of Constantinople in winter was no place for a tented hospital. So a move was made to the now deserted site of the summer hospital at Mashlak, and huts were put up instead of tents.

We M.O.'s lived in those dear little Nissen huts with semicircular corrugated roof and wooden floor. They were cold! The wind from Russia swept across the Mashlak Plain like a knife. "The wind that blows between the worlds, it cuts you like a knife." It was as bad as that. Two oil stoves and heaps of blankets were the only chance of keeping one's hut warm. January and February of 1920 were severe months. One got snow blizzards that reminded one of stories of Polar expeditions. And then there came a solid fall of snow that blocked roads everywhere. We were temporarily cut off from Constantinople, and supplies had to come out on mule convoys. At the height of this I went down with a mysterious complaint. I had a section of the hospital at some distance set aside for small-pox cases. The section filled up and I had been visiting it daily when suddenly I found myself in bed with a crop of ugly-looking spots. I was taken into hospital in what was called B Section of the German Hospital in Constantinople, which had been taken over by us and run as a section of another larger general hospital sited in disused Turkish barracks. The experts seemed uncertain of my complaint. I think it was chicken-pox or a very mild form of modified small-pox. Anyhow I was recommended for sick leave and I went home.

My next appearance in Constantinople was direct from Liverpool in the hired transport "Teutonic." Once an ocean greyhound, now grey in age and not much of a hound. This time I had boldly applied and got permission to bring out my wife. I found myself back once more at the summer Mashlak hospital. There I pitched a couple of small hospital marquees and my wife and I picnicked as best we could. We had some exciting times. The Turk was as good a thief as the Macedonian and the hospital had to be protected by so-called Serbian sentries. As I have mentioned before, these warriors were free with their rifles. Several times we were "shot over" when robbers were about. Finally I mounted a large acetylene lamp and kept it shining on the hospital like a searchlight all night.

There was a settled hutted stationary hospital at Feneraki on the Asiatic side near Moda coming vacant and as I knew my present abode was only temporary I asked for and obtained the Feneraki hospital. But before I took charge we were washed and blown out of our tents at Mashlak and moved into a flat in Constantinople. Now for the first time I came up against the system of requisitioning accommodation for officers of the Army of Occupation. I found it as difficult as finding a house to let in England in 1921. You went to the

Requisitioning Officer and told him what you wanted. He gave you a few addresses and a card to say you were entitled "to view." Just like a house agent, but with a difference. The people at the addresses *did not* want you, they wanted to stay where they were. It was comic in a way. As soon as you arrived at a flat and presented your authority the whole household flocked to the door. Then messages were sent round to all their friends. The flat filled up rapidly and by the time you gained entrance each room had at least six presumably permanent occupants! "To turn out so many people was impossible; it could not be done; where were they to go?" Finally we had to harden our hearts and take possession of one flat. The occupants of course removed every stick in the place, including all electric light fittings, etc. And for this empty flat we had to pay £12 a month rent. The landlord of the flat kindly offered to let us have the central heating at a mere bagatelle, £20 a month only! So was the Conquering Army treated in Constantinople. Now in Germany, English officers and their families were billeted on residents. Everything was provided, plate, linen, furniture, etc., and no charge made at all. Why this difference between two armies in occupation?

I was glad to get over the water to Asia. Constantinople was much too expensive for me. But there I met the same difficulty, in fact it was worse. I was told there was nothing to requisition in Feneraki. So I rented a small summer cottage from a Maltese lawyer who practised in Constantinople. He also just charged me a trifling sum, hardly worth mentioning, he said; say £25 a month? Eventually I got him to say £20. But as soon as I settled in Feneraki I saw there was accommodation to be had and pressed for it. After a long fight I got it. A better house at the usual £12 a month. Why the British officer was thus treated I do not know.

The French stood no nonsense. When a French officer required accommodation he arrived with an armed party, gave the occupants so many days to make the arrangements, and went away. At the time and date he returned with his armed party and took possession. If the occupants were still here they were gently but firmly put outside. And did the French officer pay rent? I asked one French officer and he laughed. "Oh, you English," he cried, "so correct!" The house I got was a white wooden chalet on two floors, nice in summer, but very cold in winter. The only heating was a tall earthenware stove in the hall, quite inadequate. The owners were better-class Turks. The method of keeping warm adopted in the country is to have a flat brass brazier standing in the room; this is kept filled at intervals with the fine glowing dust from the charcoal brazier in the kitchen. In very cold weather the Turk puts his shallow brazier under the table he sits at. I am talking about the semi-Europeanized Turk of the cities, not the inhabitant of the hinterland; he lives as his forefathers did. In Anatolia, where I was now stationed, one saw the Turkish small farmer and landowner; a fine hard-bitten type.

Proud and independent, with a heavy and humorous contempt for the trading Armenian, Jew and Greek. They amused him in their frantic struggle to do good business. Of course it ended in the trader getting a financial grip on the agrarian Turk, but was generally evened off by the Turk getting annoyed with this insinuating tradesman and putting a violent end to him when opportunity offered. Multiply one case by a few thousands and you provide an "Armenian atrocity." The Turk is the sahib of the Near East, he has dignity and good manners. But it is not well to let him be too strong; he is then arrogant, overbearing, and very cruel.

Our Turkish villa had to be adapted to European sanitary requirements. The Turkish "bath and annexes" do not suit us. The work was planned by Royal Engineers and carried out by Turkish workmen. The bathroom was off the kitchen and was simply a stone cell to be sweated in, like a Russian steam bath. We used a spare room as bathroom, and adopted the old-fashioned sponge bath. The house had quite a pleasant garden and a large glass-house. The latter was all smashed up in one hail-storm later on.

We started life with a Greek cook. His name was Sophocles! Just fancy shouting down the kitchen stairs for Sophocles! He was a good cook, but became too expensive. When not engaged in his culinary art he would stroll down to the garden gate to smoke his cigarette. As he always wore a white jacket and white cap he gave a tone to the villa. But the tone was much more in evidence on Sunday. That was his shaving day. On Saturday he looked like a brigand. But we had to part. Each week he received his pay he asked for a rise, and he quickly rose beyond our modest limit. Our next venture was a Maltese, who claimed to be a cook. He had little idea of his subject, and was so dirty that he looked much more like a stoker on a tramp steamer than any sort of cook. Finally, in desperation, we took on an Indian from the unit. (The hospital I now commanded was a mixed British and Indian unit.) He was known as Rajwally and was very jungley. He was docile and willing to learn. Neither my wife nor I had ever been in India, so we knew no language of Ind except the few words that have penetrated into the ordinary conversation of the British Army. However, we got on somehow. My wife used to show Rajwally what she wanted cooked, and they arrived at a common language. A potato pie was called "meat mincing, potato upstairs." On one occasion my wife wanted to start a farmyard to supply our own eggs. Rajwally was instructed to make a purchase from the itinerant vendors who carried about crates of live fowl. There was difficulty about explaining sexes, so my wife compromised by telling him to buy "six mem-sahib and one sahib!" Rajwally could never distinguish between the words Turk and turkey. When told to kill one of the latter he mildly objected, and said he would get into trouble if he did that.

Thank heavens my new command was completely hutted, and quite

respectable huts they were. The flooring was the only thing that worried me. It was badly put together, and the gaps between the floor boards were too obvious. Now there were many Turkish boat builders in the vicinity, so I formulated a plan to put them to work and caulk the floors like the deck of a boat. The Royal Engineers approved, and the work was remarkably well done. As I have said, the unit was a mixed British and Indian hospital. I had a distinct staff for each side. R.A.M.C. officers, N.C.O.'s and men, and Q.A.I.M.N.S. for the British. I.M.S. officers, Sub-Assistant Surgeons, and subordinate staff of Indian Hospital Corps orderlies for the Indian patients. Notwithstanding a certain amount of inevitable friction the hospital worked well, and was full of interest to administer. One had to be strictly impartial, and not allow any interference between one side and the other. It was at times difficult with the I.H.C. personnel. Many of them had been at war and away from their own country since 1915. Now the Indian has great home ties, and the applications to be returned to India were many and frequent. I was sorry for them, and did the best I could to help them. But it was a matter of replacements.

For the first time we were allowed to wear plain clothes instead of always being in uniform. One soon found it had its disadvantages. Instead of being treated with the due deference your uniform entitled you to, you were pushed about in the crowd. I gathered the local population took a chance of getting a bit of their own back, and enjoyed the opportunity of hustling one of the Army of Occupation. This laxity came to a sudden end, and we were ordered not only to resume the constant wearing of uniform, but also to carry revolvers. This was due to the commencing unrest in Anatolia, and rumours of intended attacks on Allied officers. I don't think the carrying of revolvers was strictly obeyed. I knew officers who used the holster as a handy recipient for a cigarette case. Officers had certain privileges, such as travelling in a reserved compartment on the ferry boat, standing on the front platform of trams, and generally being given precedence in a crowd. Living was getting cheaper as the piastre moved up. The exchange had gone up from some 350 to 900 to the pound British. I felt quite rich cashing a cheque for five pounds and coming away with forty-five hundred piastre notes. Not that the shopkeepers didn't keep pace with the exchange, but one felt richer for the time being.

Following the Denikin débâcle came that of Wrangel's army. The Bosphorus was suddenly filled with ships of all sizes and shapes, from tramp steamers to smart yachts. Every boat was packed to capacity with soldiers, civilians, women and children, escaping from the victorious Bolsheviks. It was rather terrible. The ships were so packed with humanity that they listed at all angles as they lay at anchor. I was told the conditions on board were deplorable. Practically standing room only above and below decks. Little food, little water, and no sanitation. Relief work was immediately started, and launches went round this miserable

fleet carrying food and water, and taking off the worst of the sick and wounded.

I was warned to take in a convoy of sick Russians. About fifty of them arrived. Such an extraordinary collection. Portly gentlemen in fur coats, seedy ragged men, men in remnants of khaki uniforms ; all dirty and verminous. The first thing to be done was to de-louse them all and disinfect all their motley belongings. They were all suffering from neglect and hunger, poor creatures, and many of them had relapsing fever. Thank goodness we escaped typhus. They soon improved in condition and, Russian like, their troubles faded away and they were quite cheery. We made great use of them at concerts. They sang those songs about the Volga and Dnieper, Don and Dniester. But at times we had difficulties with them. They had a troublesome habit of concealing valuables about their person or bed, having been told that all such articles must be handed over for safe-keeping to the quarter-master, and then reporting a lost ring, watch or what not, and accusing their fellow patients of having robbed them. The man who had most control over them was the cockney R.A.M.C. orderly in charge of the ward. Going to inspect one day, I found Fox standing in the middle of the ward conducting an impromptu concert; every Russian that could do so was sitting up in bed and singing lustily. I found out afterwards this was Fox's recipe for depression and grousing ; seeing'any signs of it he at once became conductor and started them singing.

(*To be continued.*)

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(*To be continued.*)

DYSENTERY[1]

By Major ALEXANDER HOOD.

Royal Army Medical Corps.

Bacillary dysentery forms about 80 per cent of all the dysentery that affects an army in peace time, and a considerably higher percentage in time of war. My remarks to-night are therefore entirely confined to the bacillary variety of the disease.

Amongst the many problems which the medical services will have to face in future wars, three stand out to my mind as being of the first importance. These are: (1) Mustard gas; (2) prevention of malaria; (3) prevention of dysentery.

The first one abounds in difficulties and the more one reads about it and studies it the more difficulties are unearthed and it appears likely to shake to its very foundations the organization of a medical service faced with it in a future war.

The malaria problem, thanks to the recent brilliant work of James and his colleagues, seems to be approaching solution, the dysentery problem as I shall attempt to show is far from being in a like case.

It is unnecessary to stress the importance of dysentery to armies, it has been their scourge throughout the ages; it also affects or did affect seriously another branch of the community, the inhabitants of asylums, a fact which might be made much of by the pacifists.

It has been dignified by having a War Office Committee appointed to consider it. During the seventeenth century it was a serious cause of death in Europe, but it is one of the triumphs of hygiene that it has almost disappeared as a cause of mortality there. However, it is still frequently present in European countries. As is well known it is endemic in many tropical and subtropical areas, but it requires no peculiarity of climate as epidemics have occurred all over the world and on the high seas.

Its importance in some areas in the Great War may be gauged from General Sir Ian Hamilton's words.

"Oh, energy, to what distant clime have you flown? I used to be energetic. . . . You see me to-day when a poor cousin to the cholera, this cursed enteritis, lays me by the heels; fills me with desperate longing to lie down and do nothing but rest. More than half my staff and troops are in the same state of indescribable sickness and this I think must be the reason the Greeks were ten long years taking Troy."

It will be convenient to consider the problem under three headings: Causation, Spread, Prevention.

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[1] A Lecture delivered at the Cambridge Hospital, Aldershot, as part of the Winter Training, on October 29, 1931.

A. Causation.

At first sight the causation of bacillary dysentery seems a very simple thing to settle, one would say that it is due to invasion of the body by organisms of the dysentery group and that would be a perfectly correct statement. But when we come to consider how the dysentery bacilli obtain a footing in the body the problem is by no means so simple. We know that they can only enter the body by the mouth, although infection *per rectum* is a possibility and one which may account for a few cases arising in hospitals, infection by the mouth is for all practical purposes the only method. But experimental work is very definitely against the possibility of infecting healthy human beings by ingestion of dysentery bacilli. The classical experiments of Strong and Musgrave showed that in order to produce infection in human beings fed on cultures of dysentery bacilli it was necessary to neutralize the acidity of the stomach. Again, about twelve years ago Scheer making experiments on the bactericidal action of gastric juice on certain organisms, amongst which were the dysentery bacilli, found that normal gastric juice kills pathogenic bacilli in two minutes. So that the normal gastric juice is a powerful barrier to infection. Supposing the dysentery bacilli do manage to get past the stomach they very soon come up against another barrier to infection, viz., the large numbers of much more robust organisms occupying the intestines; these organisms rapidly overwhelm the delicate dysentery bacilli in cultures and there seems to be no reason why they should not do the same in the body. And lastly, the intestinal mucosa in the intact state is powerfully resistant to attacks by organisms just as the intact skin is. You will therefore agree that we have to modify our opinion about the causation of the disease, and it is perfectly easy to do so by saying that the infection by these bacilli is made possible by lowered resistance of the patient or increased virulence of the organism. That will effectually cloak our ignorance and put a stop to any more questions, but it will not help us to prevent the disease—the more we know about the means by which the various barriers to infection are broken down the better position we shall be in to uphold them and prevent infection. If we consider first the gastric juice, the experience of fractional test meals has shown us that in five per cent of normal subjects in perfect health and with no symptoms of indigestion no hydrochloric acid is secreted—a condition of achylia gastrica. Again, certain meals, such as the ingestion of a pint of gruel, lower the acid level to the zero point, and the excess imbibition of fluids rapidly dilutes the juice below the point at which it has any antiseptic value. In addition regurgitation through the pylorus beginning during the second hour of digestion of a meal has the same effect. Apart then from the unfortunates with achylia gastrica, it is evident that one is more liable to infection: (1) after drinking large quantities of fluids; (2) between one to three hours after a meal, in fact until the appetite juice begins to be secreted. These findings point to means of prophylaxis.

The second and third barriers, namely the organisms and mucosa of the intestinal canal, may conveniently be considered together. Besredka has shown that the administration of bile to rabbits renders their intestinal mucosa susceptible to infection by bacilli, and Kauntze has observed that in bacillary dysentery there is a disturbance of liver function and an increased flow of bile in the early stages. These observations explain how it is possible for the dysentery bacilli to pass into the submucosa and to avoid being overwhelmed by the other intestinal organisms, and indicate methods of prophylaxis which will be discussed later.

So you see that the problem of infection, which at first looked perfectly simple and a matter for the bacteriologist to explain, has become rather complicated and requires a good deal of work on the part of the biochemist to put prevention on a sound footing. The lowered resistance is due to an actual biochemical change in the body fluids and tissues at the site of entrance and invasion. In other words, the state of the tissues at the time of entrance of the organism must determine whether or not infection takes place. It is common to find when inquiring into sporadic cases of bacillary dysentery in an endemic area that a great many men have shared all the food and drink with the patient, and yet he is the only one to be infected—he was the only one whose tissues were in a susceptible state at the time when the organisms were swallowed. The state of the tissues then becomes a consideration of the first importance in prophylaxis.

B. The Spread of the Disease.

The factors concerned in the spread of the disease are :—

(1) The reservoir of the infecting organism.
(2) The vector of the organism.
(3) The recipient of the infection. (The recipient has been fully discussed under Causation.)

(1) *Reservoir of the Infecting Organism.*

The dysentery group of bacilli exist in nature in the intestinal canal of man and in his excreta, also in dogs and monkeys, and as the only method of infection is by the mouth, it follows that, as Vaughan put it, "Dysentery is always due to the transfer of the excreta of one person to the ingesta of another," an extremely unpalatable truth.

The source of the organism must be man; the so-called carriers are usually divided into: (*a*) healthy; and (*b*) convalescent. The healthy carrier in bacillary dysentery is a person whose existence I firmly believe to be a myth; there is no such person. All those from whose excreta dysentery bacilli can be isolated, have signs of the disease which can be found if looked for properly. Two Japanese workers, Saisawa and Tanabe, examining recruits for the Japanese Army, found that out of 2,847 men, 15, i.e., 0·52 per cent, were carriers of dysentery bacilli, but the use of the sigmoidoscope in these positive cases revealed ulceration or inflammation, and they

conclude that the so-called healthy carriers are very mild cases of the disease.

It seems to me impossible that the delicate dysentery bacilli can live in the intestine without getting into the submucous layer and there they cause inflammation; consequently you cannot have a healthy carrier. It has to be remembered that dysentery may be an extremely mild condition and every bacteriologist has at times isolated the organism from cases which appeared to be mild diarrhœa. Perry, who has also studied this question, states that in the majority of the carriers he examined there was some obvious ulceration of the large intestine, and that the disappearance of the organisms from the stools coincided with the improvement clinically of the cases. In other words, the cured case was non-infectious.

The so-called healthy carrier therefore does not exist as the carrier of such an organism as the *B. typhosus* does; he has signs of the disease which can be detected either by the naked eye or by microscopic examination of the stools or by the sigmoidoscope.

The healthy carrier is really a missed case, and to my mind in endemic areas is practically the sole source of infection. Everyone who has served in areas where bacillary dysentery is endemic realizes that the inhabitants look upon even a moderately severe diarrhœa much as the European looks upon a cold in the head. The large majority of such diarrhœas are due to Flexner infections. When that is realized it seems to me unnecessary to look any further for the source of infection, it is present in abundance and generally quite beyond the control of anyone. Cunningham has shown that twenty-two per cent of the population of Madras and Bengal suffer from what he terms latent dysentery, that is, they pass blood and mucus at intervals. If we consider that most of the mild diarrhœas are also dysentery it would not be very wide of the mark to say that about forty per cent of the population of endemic areas are constantly endemic infectors.

What of the convalescent carrier? He may go on secreting organisms at intervals, for as long as twelve months, but he has always detectable signs of disease. In other words, he is not really convalescent. His stools show signs of inflammatory exudate. The criterion of cure in India now is not the absence of the organism from the stool but the absence of mucus from formed stools during convalescence. The ideal method, of course, would be sigmoidoscopic examination combined with naked eye examination of formed stools for mucopurulent material, and if this be present it should be examined bacteriologically and microscopically for signs of inflammatory products, and as long as any inflammatory products are detectable the case should not be considered as cured. Such methods will completely eliminate the convalescent carrier from those cases who come under hospital treatment, unfortunately a very small proportion.

The disease is therefore spread from case to case. The uncontrolled or missed cases in my opinion are the main source of infection.

(2) *The Vector of the Infecting Organism.*

Direct.—No vector may be necessary, the spread may be direct. Any of these mild uncontrolled cases may infect everything he touches—handles of doors, drinking vessels, plates, knives, forks, food, etc. If he be employed in the handling, preparation, or serving of food his powers of infection are, of course, enlarged. In good sanitary surroundings his scope is limited if he uses intelligently the appliances provided. The fact that even with modern sanitation asylums are still subject to this disease is due to the insanitary practices of their inmates. In indifferent sanitary surroundings, such as military necessity imposes from time to time on an army in the field, or where fatigue or danger militates against sanitary precautions, the possibility of spread from these cases is infinitely greater.

Indirect.—The vectors concerned are: (1) Human beings; (2) dust; (3) water; (4) milk and its derivatives; (5) the fly.

(1) The human being. He may carry the infection although not suffering himself, e.g., cooks using infected latrines and conveying infection to articles of food, or men using infected latrines and conveying infected material on their boots to their mess rooms and thence to their food. Another example, well depicted in the Wellcome Museum, is that of the native servant who attends to and handles his sick child suffering from dysentery immediately prior to serving his master's food.

(2) Dust. The bacilli if not exposed to direct sunlight will stand desiccation well and it has been suggested that dried and powdered fæces blown about might contaminate food. If this were a very potent source one would expect a high incidence in the dry season in the tropics, whereas the season of greatest incidence is during and immediately after the rains when dust is at its minimum. Dust plays little part in the direct spread of the disease; indirectly, by irritation of the intestinal canal, sand and dirt may be a predisposing cause.

In damp sand the bacilli may live for thirty-nine days so that cleaning food utensils with unsterilized sand may be a source of infection and this was said to have been the cause of an outbreak in Scotland during the Great War.

(3) Water. The bacilli are rapidly outgrown by other organisms in water; but if water, sterilized by boiling, becomes infected later, they can live for several weeks. In ice, bacilli can remain alive for over a month. Theoretically therefore water may be infected, but practically water-borne epidemics seldom occur.

(4) Milk and its derivatives. An uncontrolled case at the dairy may infect a milk supply and an outbreak result. Such an outbreak, due to the Sonne bacillus, was reported a few years ago from St. Andrew's. Tinned butter which is largely consumed in the tropics, and much of which is manufactured under conditions of such filth as would make it seem impossible to avoid infection, does not infect. This is because the butter is so acid that the bacilli very soon die. I was curious about this and obtained

some tins of Indian-made butter and infected the butter with large doses of cultures of dysentery bacilli, but after a month at room temperature the bacilli had disappeared ; so that even if butter is heavily infected the acidity is sufficient to destroy these organisms after a short period of storage.

(5) The fly. A greal deal of work has been done to prove that the fly is a carrier of disease, and more especially of the enteric and dysentery groups. Amongst those who have done such work Faichnie of our own Corps made some interesting experiments with flies and the *B. typhosus*, and Tebbut has confirmed his findings, but he used the *B. dysenteriæ* (Flexner Y) and his results seem to show that this bacillus is more adaptable to the fly than *B. typhosus*.

Dysentery bacilli have been isolated frequently from flies by Dudgeon, Manifold and other workers, and the general conclusion is that flies convey the infection not only on their legs and wings but also in their intestines, and not only to man's food but also to other flies. In addition, it has been shown frequently that the fly season is the dysentery season, and that while in endemic areas there is always a certain amount of dysentery the increase at certain seasons of the year corresponds with an increase, generally very marked, in the number of flies.

We are now in a position to sum up the causation and spread of the disease which may help us to consider its prevention.

The cause of the disease is the dysentery group of bacilli which are able, under certain conditions, which have been considered, to obtain entrance to the human body.

The sources of these bacilli are the missed or uncontrolled cases of the disease, not strictly speaking carriers.

The bacillus is conveyed to man by various vectors the chief of which are human beings, who are probably responsible for the majority of cases in endemic areas, and flies, which are responsible for epidemics and for sudden seasonal increase in the incidence in endemic areas.

Bearing those facts in mind we can now look at the means of prevention.

Prevention.

In "Modern Medicine" by Osler and Macrae, McLean, writing of dysentery says "Even with our present knowledge of the disease it has been remarked that, from the standpoint of prevention of dysentery in campaigns, we are nearly as badly off as Xenophon was during the Greek retreat from Persia."

A comparison of the incidence of the disease in the Great War on various fronts with the incidence in earlier wars leads one to a like conclusion (see Tables A and B).

Moreover, these figures only represent the admissions to hospital; there were thousands who carried on because they had to.

Listen to A. P. Herbert writing of dysentery in the Dardanelles in

his book "The Secret Battle": "It became universal, everybody had it and everybody could not be sent away; in the worst stage only a dull misery of recurrent pain, lassitude and disgust. Finally there came a terrible debility, a kind of paralysing lassitude—when it needed a genuine flogging of the will for him to lift himself and walk across the camp."

Our modern methods of prevention failed in the last war. What was the reason for this failure?

The Medical History of the War shows that dysentery was most prevalent during certain times and these were after an attack which had

TABLE A.—INCIDENCE OF DYSENTERY IN THE BRITISH EXPEDITIONARY FORCES DURING THE GREAT WAR, WITH DEATHS AND RATIOS PER 1,000 OF RATION STRENGTH.

Campaign	Period	Force	Admissions	Deaths	Ratio per 1,000	
					Admissions	Deaths
France and Flanders	Aug.-Dec., 1914	British and Dominion	861	4	4·53	0·02
	1915		1,559	24	2·64	0·04
	1916		5,776	40	4·37	0·03
	1917		6,025	46	3·18	0·02
	1918		12,211	46	6·58	0·02
Italy	1918	British	901	17	9·52	0·18
Macedonia	Oct.-Dec., 1915	British and Dominion	811	14	13·32	0·23
	1916		8,204	169	66·49	1·37
	1917		5,792	124	31·72	0·68
	1918		9,438	173	73·31	1·34
Dardanelles	Apr., 1915-Jan., 1916	British	29,728	811	253·94	6·93
Egypt and Palestine	1916	British and Dominion	5,597	81	29·78	0·43
	1917		4,341	139	23·27	0·75
	1918		4,906	264	21·23	1·14
Mesopotamia ..	1914-15	Whole Force.. ..	3,476	33	109·06	1·04
	1916		15,270		92·34	
	1917		11,959	286	38·89	0·93
	1918		12,290	303	29·86	0·74
North Russia ..	1918-19	Archangel	8		1·07	
		Murmansk	6		1·50	
East Africa	June-Dec., 1916	Troops	8,902	306	182·21	6·26
		Followers	3,795	1,008	48·10	12·78
	1917	Troops	14,045	429	277·01	8·46
		Followers	26,607	7,277	184·82	50·55
	1918	Troops	3,294	86	80·28	2·10
		Followers	3,740	681	42·68	7·77
South-West Africa ..	1914-15	Dominion	715	13	21·67	0·39
United Kingdom ..	Aug.-Dec., 1914	British and Dominion	220	3	0·17	
	1915		570	2	0·39	
	1916		421		0·26	
	1917		485		0·28	
	1918		353		0·22	
South African War ..	1899-1902	British and Dominion Other Ranks only.	38,108	1,343	68·60	2·42

Note.—Blank spaces denote no information available.
The ratios for the South African War are average annual ratios per 1,000.

TABLE B.—DYSENTERY—ADMISSIONS TO HOSPITAL—RATIOS PER 1,000.

Campaign	PERIOD				
	1862-65	Oct. 27, 1899-Sept. 28, 1900	1916	1917	1918
American Civil War ..	32·200				
South Africa		56·1			
East Africa				486·56	116·51
Salonika			63·89	28·89	58·23
Mesopotamia			50·94	60·34	51·12

The figures for the American Civil War are taken from Woodward's "Medical and Surgical History of the War of the Rebellion"; the figures for South Africa from the Report of the Commission on the Nature, Pathology, Causation and Prevention of Dysentery, August, 1900; the remaining figures are from "Official History of the War, Medical Services, Diseases of the War," Vol. I.

been successful or in an area which was continuously under shell fire, such as Gallipoli. Under these circumstances military necessity has imposed fatigue and danger on the troops to such an extent that sanitary measures cannot be carried out and, in my opinion, it is useless to expect it. There is nothing wrong with the methods advised, it was their execution that was faulty, and that will remain faulty.

The hygienists have done wonders in providing simple and portable appliances of marvellous ingenuity, but as long as tired men in dangerous situations have to be depended upon to work out their own sanitary salvation, such work will be neglected; they are more concerned with digging cover for themselves than latrines.

We are told that the next war will be a war of movement; if so, the conditions I have mentioned above will be much more frequent than in the last war and as a consequence, if climatic conditions are favourable, it is safe to predict that dysentery will be *the* problem, as it was in the East Africa Campaign.

Let me quote Major-General Beveridge writing in the Medical History of the War: "With mobile troops in the actual fighting line, unavoidably exposed to conditions of extreme hardship, exposure and irregular diet, sanitary efforts were bound to fail in showing results proportionate to their extent. There was always a zone of shell-fire where sanitary measures were almost impossible." What can be done about it? It is no use our sitting back and saying, "Well, we have told you what to do if you want to prevent dysentery; if you can't do it, it is not our fault." Can the hygienist simplify his methods still further or will he demand more personnel to carry them out? These are questions which I am not competent to answer.

It is quite impossible in a short paper like this to deal with all the

methods of sanitation employed to protect the troops against dysentery, but if we bear in mind the fact that these methods have failed it seems to me of importance, while continuing to develop and practise the highest possible standard of sanitation in the field, to look at the problem from another point of view.

So far the whole of our methods of prevention have been collective. Is there no individual protection against dysentery?

Four years ago, when I had occasion to go through a great deal of the literature on dysentery, I came across an extract from one of Virchow's works written in 1871. He had noticed that during the prevalence of epidemic dysentery, which was undoubtedly bacillary, in the Charité Hospital, Berlin, the disease chiefly spared the syphilitic wards in which, at that time, the patients were treated without mercury by a method in which laxative medication was prominent. This seemed to me an important observation which had apparently been overlooked and one which ought to have a practical application to prophylaxis.

As you know, the majority of all cases of bacillary dysentery can be rendered free from all symptoms very quickly by treatment with saline purgatives, so that what Virchow had really observed was an illustration of the abortive treatment of the disease. His patients were equally exposed to infection, but the organism was driven out of their intestines before it had time to infect.

I have tried this method of personal prophylaxis in endemic areas on a very small scale and feel that it is worthy of an extensive trial. The salt used is probably immaterial, but I have used sodium sulphate first thing in the morning, in doses sufficient to produce one watery motion—the dose varies from 60 to about 180 grains in different individuals.

I can see little difficulty in its practical application in the field. The prophylactic dose need only be given when, as I have already shown, dysentery is most to be expected and to tide over the period during which sanitary arrangements are defective. Its prolonged use will do no harm, and indeed will probably produce that sense of well being so well illustrated in the advertisements ot a well-known proprietary article.

Following the success of vaccine prophylaxis against the enteric group of diseases, the question of why no similar vaccine has been produced for the dysentery group is frequently asked.

Now the fact is that innumerable vaccines and other antigens have been made to produce immunity against the dysentery group of bacilli and some of them are worthy of consideration.

Before considering them I should like to remind you of certain facts about these organisms. You will remember that there is the Shiga bacillus and a group of bacilli now generally referred to as the Flexner group. One of the stumbling blocks in the way of vaccine making was the toxicity of the Shiga organisms. This has now been got over in various ways, and large doses of these organisms can be injected without serious reaction.

Another trouble is the confusion in regard to the members of the Flexner group and the fact that when injected this group, on the whole, produces, as far as we are able to judge, a very feeble antibody response from the patient.

Of the numerous vaccines that have been made I will only mention the most promising. In 1925, Perry and Coppinger, working in the Royal Army Medical College, produced a mixed Shiga-Flexner vaccine and found they could inject 20,000 million Shiga bacilli into human beings without excessive local or general reactions. This mixed vaccine when inoculated into men produced agglutinins for both types of organisms. On the analogy of the toxin anti-toxin immunization against diphtheria a substance called dysbacta, a mixture of dysentery bacilli, dysentery toxin and dysentery anti-toxin, was produced in 1917 by Bochneke. It was given in three doses, 0·5, 1, and 1·5 cubic centimetres at intervals of five days, and was followed by evidence of immunity production in the subject of the inoculation. A lipo-vaccine of dysentery bacilli was produced by two Americans, Whitmore and Fennel; it could be injected without marked local or general reaction, and in the blood of those inoculated, agglutinins, precipitins and bacteriolysins were found and some evidence of complement fixation, that is, several tests showed the presence of a degree of immunity. This vaccine is difficult and expensive to make.

Many other vaccines have been made, including some in which the dysentery element of the vaccine is combined with a T.A.B. vaccine. This latter is a very desirable step, but not one to be taken without very careful consideration.

Oral Vaccination.

This method of prophylaxis based upon Besredka's theory of local cellular immunity has been tried fairly extensively in dysentery. The method consists in the administration by the mouth of tablets of dried sterilized, pulverized bacilli, made into tablets by means of a machine and coated with varnish.

There are conflicting opinions about its usefulness. Certain authorities have stated that oral immunization has been shown statistically to immunize human beings quickly and for a dysentery season. There is, unfortunately, no means except the statistical one of proving whether oral vaccination does immunize, because animal experiments only prove that the particular animal can be protected, and oral vaccination does not result in the production of demonstrable antibodies in the blood such as are found after subcutaneous inoculation. Other authorities have come to the conclusion that Besredka's experimental work is incomplete and does not afford sufficient foundation for the application of oral vaccination to man. Recent work in the Madras Presidency with oral vaccination against cholera seems to show that this method affords as good protection as does the subcutaneous inoculation of cholera vaccine.

There is still a further method of producing immunity which requires

to be considered, and that is by means of the bacteriophage. This is a curious substance which has the power of producing lysis of a culture of the appropriate organism when added to it. It has been used in treatment, and d'Herelle states that he has immunized rabbits to two surely fatal doses of the Shiga bacillus by injection of a quarter of a cubic centimetre of a suspension of the Shiga bacteriophage. This antitoxic immunity is established in six days after the injection and persists for at least three months. Up to date, I do not think this method has been tried in human beings.

A very great deal of work has been done on the diagnosis of dysentery but very little on its prevention.

Unless we are going to be in the same helpless state with regard to the prevention of dysentery in the next war as we have been in the past, it seems to me quite evident that the hygienic measures which have been relied upon and which have failed to produce satisfactory results, must be reinforced.

For that reinforcement some method of immunity production is required; to produce this more research work and careful human experiment are needed and the possibilities of administration of salines as a temporary measure should also be inquired into.

I am indebted to Major-General J. A. Hartigan, C.M.G., D.S.O., K.H.P., D.D.M.S., Aldershot Command, for permission to publish this lecture; the quotations from Sir Ian Hamilton and A. P. Herbert are taken from "The Official History of the War, Casualties and Medical Statistics."

Editorial.

THE VALUE OF TUBERCULIN TESTS IN MAN.

In a Report issued by the Medical Research Council the present position of tuberculin as a diagnostic agent is reviewed by Dr. D'Arcy Hart, who gives his observations of the reactions of 1,030 clinically tuberculous patients of all ages and all types of infection, in contrast with those of 751 clinically non-tuberculous patients of all ages.

Numerous tests depending on the allergic response of tubercle-infected persons to the products of tubercle bacillus have been employed for the detection of tuberculosis. The active constituent which has the power of eliciting the typical skin reaction in tuberculous animals is now believed to be protein in nature, and to be present in the various preparations derived from tubercle bacilli.

Tubercular sensitization is stated to be an example of the type of allergy that Coca and Cooke have called "hypersensitiveness of infection." This type must be distinguished from true anaphylactic sensitiveness induced by the previous injection of any foreign protein antigen. This state can be produced with proteins from tuberculin and with proteins from the bodies of tubercle bacilli, and may exist in an infected animal at the same time as tuberculin hypersensitiveness.

There is evidence that tuberculin hypersensitiveness may be accompanied by cutaneous reactivity to various non-specific protein substances, though larger amounts of these are required to elicit a response. It seems, therefore, that the specificity of the tuberculin response must be regarded as quantitative rather than absolute.

The evidence that tuberculin hypersensitiveness in man is the result of tuberculous infection rests on the results of post-mortem examinations of human beings, whose reactions to tuberculin have been tested during life. These examinations have shown that under natural conditions tuberculin hypersensitiveness is constantly associated with tuberculous infection.

Tuberculin surveys of the population and post-mortem examinations indicate that the percentage incidence of positive reactions in the majority of civilized communities increases with age, and by the time adult life is reached most of the urban working-class population respond to the test positively.

Clinical and radiographical examinations of children have shown the development of focal lesions simultaneously with the development of cutaneous hypersensitiveness to tuberculin. Both increase with age and more rapidly in children exposed to infection within the home.

Experiments on animals by numerous observers indicate that tuberculous infection induces tuberculin hypersensitiveness which fluctuates according

to the various phases of infection. It has been shown that true and lasting hypersensitiveness to tuberculin can be obtained in animals, not only by injection of living tubercle bacilli but also by injection of bacilli killed by heat, and that the hypersensitiveness is alike in both cases. The sensitivity induced by dead bacilli may be associated with the formation of tubercles histologically similar to those following infection with living organisms. It is, however, doubtful whether, in nature, skin hypersensitiveness and tubercle formation can arise from dead tubercle bacilli derived from the lungs or alimentary canal.

Tuberculin cannot induce hypersensitiveness in an individual not infected with tubercle. Hamburger injected as much as 1,000 mg. of tuberculin in children not infected with tubercle, but did not induce general or specific local reactions. In a subject who has been infected by tubercle the degree of skin reactivity to tuberculin may be increased by repeated cutaneous application or intracutaneous injection of old tuberculin. There is also a distinct interval between primary infection and the appearance of skin reactivity.

From the investigations which have been made, it seems justifiable to assume that a positive skin reaction indicates that an individual has at some time or other been infected by the tubercle bacillus. But the question at once arises, is the individual still infected, viz., are living bacilli and unhealed tuberculous foci still present in the tissues? Dr. Hart says the data are as yet insufficient to answer this question definitely. There is some evidence that in man and in experimental animals tuberculous infection may become extinct with the death of the bacilli and complete healing of the anatomical lesion. On the other hand, Opie has found that living bacilli may be found in apparently healed foci at necropsy. In many of the cases tested for skin reactivity, von Pirquet's test was used and the full sensitiveness of the test was not used, so it is possible that reactivity was never completely lost. Some of the Austrian patients were negative to von Pirquet's test, but reacted when the intracutaneous method was used. Until, therefore, there is clearer evidence that the extinction of all tuberculous infection in man is followed by complete disappearance of detectable allergy, Dr. Hart thinks it is wiser to assume from a positive response that infection has occurred at some time in the individual's life, without attempting to decide whether it is present or extinct.

The question is not merely of academic importance, for on it depends the significance of tuberculin surveys that have been carried out in various parts of the world. If complete loss of skin reactivity to tuberculin means the extinction of infection, then the sensitization incidence of a community corresponds to its infection incidence, viz., the percentage of persons infected with tubercle. If skin reactivity persists in small amount after complete healing, then the sensitization incidence may include some in whom the infection has died out; it will not be a true infection incidence.

While a positive skin reaction may be considered to indicate that an

individual at some time or other has been infected with tubercle, the significance of a negative reaction will depend on the type of case tested and on the method and dosage employed.

There is little doubt that complete tuberculin insensitiveness occurs during the latent period following tuberculous infection, after desensitization with tuberculin and in the so-called anergic tuberculous skin diseases. Many other conditions have been classed as non-reactive owing to the insensitiveness of the test employed. By using the intracutaneous method and increasing the strength of the tuberculin from the standard $\frac{1}{1000}$ mg. dose to the maximum concentration, viz., undiluted tuberculin, it has been shown that the reactivity in tubercle with marked toxæmia, in meningitis and miliary tuberculosis is only depressed and not entirely lost.

In a miscellaneous series of patients known to have clinical tuberculosis, Dr. Hart found one hundred per cent were positive when tested by the intracutaneous method, employing maximum doses when necessary. It is assumed, therefore, that a negative tuberculin reaction excludes the presence of tuberculous infection; but we cannot say that such an infection has never occurred, owing to the possibility that skin sensitiveness may disappear completely when an infection has become extinguished.

The various tests which have been used are: (1) the subcutaneous test; (2) the local subcutaneous test (*Stichreaction*); (3) the conjunctival test; (4) the percutaneous (Moro) test; (5) the cutaneous (von Pirquet), and intracutaneous (Mantoux) tests.

The subcutaneous test depends for its interpretation on the production of pyrexia, and as it is not free from danger is not much used now. Some observers consider this test more sensitive than other methods, but it is doubtful whether it is more accurate than the graded intradermal test. The Medical Research Council Tuberculin Committee consider it to be unwieldy and difficult of interpretation.

The Stichreaction of Escherich is advocated by Hamburger, who considers it a thousand times as sensitive as the cutaneous test. An injection of 0·1 c.c. of a dilution of tuberculin is made into the superficial subcutaneous tissue, usually of the forearm. Redness and infiltration about the area constitute a positive reaction. The test is usually employed supplementarily to the cutaneous (von Pirquet) test, but it is not much used outside Austria and Germany.

The conjunctival test is considered to be unjustifiably painful and not very reliable; it has been abandoned by most workers. The percutaneous test is made by rubbing on ointment consisting of equal parts of old tuberculin and anhydrous lanoline into the skin of the chest or abdomen. It proved considerably less sensitive than von Pirquet's test when both were applied to the same individual.

The cutaneous and intracutaneous tests are the only two widely used at the present time. A large number of investigations have been made in which the sensitiveness of the two tests has been compared in the same

series of individuals. The evidence thus obtained seems to show that the intracutaneous (Mantoux) test is one thousand times as sensitive as the cutaneous or von Pirquet test if the same concentration of tuberculin is used for each test. In the von Pirquet test, undiluted tuberculin is generally used and the same strength is employed when re-testing patients; but in the Mantoux test 1 in 1,000 dilution is as sensitive as the von Pirquet test, so it is possible to use ten, one hundred, or even one thousand times the initial test when re-testing patients. In the von Pirquet test the quantity entering the skin is variable and cannot be measured, so the quantitative use of the test is limited. The Mantoux test affords a means of administering a known dose of tuberculin at a known depth of the skin.

The quantitative test has been suggested for use in relation to the prognosis and diagnosis of cases, the intensity of reaction being measured, or varying dilutions of tuberculin being employed. As the result of a careful correlation of radiographical and clinical manifestations in children with their tuberculin reactions, Opie concluded that the greater the reaction or the weaker the dilution to which a child would respond the greater was the chance of his having grave tuberculous infection.

Dr. Hart has attempted to test the hypothesis that the weaker the solution of tuberculin to which a patient will react positively the more likely he is to be suffering from clinical tuberculosis, rather than from tuberculosis without manifest symptoms. He constructed charts showing the relation between the percentage of positive reactors and the concentration of tuberculin used among the clinically tuberculous and the clinically non-tuberculous. The curves of the clinically tuberculous with increasing dilutions of tuberculin fell more slowly than did the curves of the clinically non-tuberculous. This suggested that the latter would meet the base line first and a dilution might be found which would give reactions in the clinically tuberculous only. Unfortunately, the solution would then be so weak that few clinical cases would react to it, and for practical purposes the method could only be used in dermatology, where examples of clinical tuberculosis associated with extreme cutaneous sensitization are met. Dr. Hart found that the curves of the percentage of positive reactors to different dilutions of tuberculin among patients with tuberculous cutaneous lesions fall more slowly as the dilution increases than is the case with most other forms of tuberculosis.

While quantitative tests with very high dilutions of tuberculin are most likely to prove useful in dermatology, Dr. Hart states that quantitative skin tuberculin tests in clinical practice have, in the main, proved disappointing so far as the positive reaction is concerned. The interpretation of positive reactions to various dilutions of tuberculin when the diagnosis or prognosis of a clinically tuberculous patient is in question calls for considerable experience, and the information given is at best only probable. He thinks that a method of this type suitable for routine work may ultimately be developed.

The positive reaction has its chief clinical value in infancy; the younger the age the worse is the prognosis. Dr. Hart suggests the following procedure for patients of the hospital class. The intracutaneous test should be adopted for the detection of tuberculin sensitivity in early life. An infant under two years showing a positive reaction but without symptoms should be kept under observation for some years. A positive reaction in a child two to five years of age with persistent symptoms should suggest that these are tuberculous in origin. When a child over five gives a positive reaction to a quantitative test, it should not be concluded that clinical tuberculosis is present, even in a suspicious case. The quantitative test with weak tuberculin solutions may have a diagnostic value in these cases, but requires considerable experience, and it is not recommended for routine use.

Dr. Hart considers that the usefulness of the tuberculin test in diagnosis must come mainly from a negative response, in so far as it excludes the disease. Mantoux wrote that a negative test, except in measles, meningitis, miliary tuberculosis and advanced cases with marked toxæmia, is an argument of the first order in excluding tuberculosis . . . contrary to most clinical methods the value of the intracutaneous test lies in negative results.

The von Pirquet test as ordinarily performed having an error of fifteen per cent is not suitable for negative diagnosis in cases of suspected clinical tuberculosis.

The Mantoux test as usually carried out with doses of 0·01 milligramme and 0·1 milligramme of tuberculin is also far from ideal for the negative diagnosis of tuberculosis. Engel suggested that the unsatisfactory results of the intracutaneous method were due to the dosage being too small, and recommended concentrations of 1 in 100 (= 1 mg.) and 1 in 10 (= 10 mg.) or even undiluted tuberculin (100 mg.) before pronouncing a case free of tuberculosis. Happ and Castris found that 93 per cent of clinically tuberculous patients reacted to the 1 in 100, and 100 per cent to the highest concentration.

At the suggestion of Dr. O'Brien, Director of the Wellcome Physiological Research Laboratories, Dr. Hart carried out an investigation on a large scale to determine the error of a negative intracutaneous reaction in excluding clinical tuberculosis. Human Old Tuberculin was put up in dilutions 1 in 10,000, 1 in 1,000, 1 in 100, 1 in 10, and 1 in 1 (undiluted). A reaction was considered positive if it consisted of an area of erythema or erythematous infiltration whose greatest diameter equalled or exceeded five millimetres. The tests were carried out on 1,030 clinically tuberculous patients of all ages, in whom the diagnosis was considered to be certain.

The observations showed that a negative intracutaneous reaction to 1 in 10,000 dilution of tuberculin, or to the standard 1 in 1,000 dilution, does not exclude clinical tuberculosis. A negative test with 1 in 10

dilution has an error of only 2·3 per cent, and Dr. Hart considers that there is no object in using solutions stronger than 1 in 10 dilution for excluding clinical tuberculosis.

As a control of the investigations 751 clinical non-tuberculous members of the hospital class in London were examined. These observations showed that to exclude tuberculous infection with certainty in a clinically non-tuberculous individual a concentration up to 1 in 10 solution must be used.

Atypical non-specific reactions were sometimes seen, especially after the higher concentrations of old tuberculin; the most important were infiltrative erythematous reactions met with in individuals not infected with tubercle. Their rapid development to a maximum and their rapid subsidence help to distinguish them from true tuberculin reactions. Reaching their height during the first twenty-four hours, they have usually disappeared by forty-eight hours, when tubercle reactions are, as a rule, maximal, so that confusion is avoided in most cases if the tests are not read before the second day.

At the present time it is commonly believed that the diagnostic value of the tuberculin test is confined to early life. Dr. Hart says this belief is in the main correct as regards the positive diagnosis, but as regards the intracutaneous test for the negative diagnosis he thinks it is worth while to perform the test where the patient has a reasonable chance of giving a negative reaction should his condition *not* be due to tuberculosis. This chance is determined by the incidence of negative tuberculin reactions among the clinically *non-tuberculous* population. Inquiries made in some of the large cities on the Continent have revealed the fact that half the children of the poorer classes are tuberculin positive by 5 years of age, about three-quarters by 10 years of age, and nearly all give positive reactions by the time puberty is reached. In such conditions it is clearly waste of time to apply the test with the object of excluding tuberculosis if the patient is over 10 years of age.

These figures have been generally accepted, but recent investigations of the London hospital class have shown that only twenty per cent reacted positively by 5 years of age, forty-five per cent by 10 years, and seventy-five per cent by 16 years. Almost all the adults (ninety-five per cent) were found to be positive. It seems therefore worth while to apply the test throughout childhood; but there is no advantage in testing adults of the urban class.

The epidemiological applications of the tuberculin test have been studied by various observers, especially in connection with the relative importance of heredity and contagion in the production of non-bovine tuberculosis in children and adults.

Opie and McPhedran's observations in Philadelphia suggested that the tuberculization of home contacts, viz., children exposed to an open case of tuberculosis in the home, has its maximum rate in infancy and early child-

hood, while the tuberculization of non-contacts occurs at approximately the same rate from birth to manhood. This accords with the dissimilarity in their exposure to infection. Children in tuberculous households are exposed to intense contagion from birth, but children whose homes are free from open tuberculosis make their contact with the disease mainly outside the house and with increasing frequency as they grow up.

Dr. Hart made a study of London children of the hospital class and concluded that most of the tuberculization of home-contacts takes place in the home environment, whereas most of the infection of non-contacts occurs in later childhood and adolescence. Both groups however are tuberculized to the same degree when adult life is reached. The London figures suggest that a positive family history of tuberculosis is of importance in determining infection only in so far as it yields a potential source of contagion in the form of an open pulmonary case. If two sets of children, one with a strong tuberculous ancestry and the other free from this taint, are exposed to the same infective agent, both are equally liable to acquire infection. Dr. Hart considers that such a view is not inconsistent with a conception of heredity as a determinant of the subsequent course of infection, once it has taken place.

The tuberculin test has been used to determine the distribution of tuberculous infection in various parts of the world. Apart from post-mortem examinations, it is the only means of doing this and of recording the changes in tuberculization of a community from decade to decade. Dr. Hart considers the study of the tuberculin reactions of the clinically non-tuberculous members of a community to be of considerable practical importance. As already explained, Dr. Hart states that owing to deficiencies in technique it is difficult to deduce the sensitization incidence of a community from the frequency of positive reactors to the tuberculin test, but certain conclusions may be drawn from the results of tuberculin surveys: (1) The sensitization incidence among home-contacts is greater than among non-contacts; (2) it is greater among the poor than among the rich; (3) it is usually high among the poorer classes of densely populated cities where pulmonary tuberculosis is rife, the standard of hygiene low and the milk supply defective, but tends to be lower where living conditions are better and phthisis less common; (4) it tends to be low in white rural communities; (5) the sensitization incidence among the children of the poorer classes, or general population of the majority of cities recently investigated with the intracutaneous test, is lower than it was twenty years ago in some of the Continental cities, where the most prominent of the earlier inquiries were carried out (e.g., in Vienna); in certain instances, however, e.g., the Philadelphia survey, high figures have been noted recently.

The optimal tuberculization of a community is an important question. That primary tuberculous infection in man can confer some degree of protection against subsequent active disease has been inferred from the results of post-mortem examinations and from the study of the evolution of tuberculosis amongst primitive peoples.

The fact that natural tuberculization has a greater fatality in infancy than at other ages suggests that the infection should, if possible, be deferred until later. The evidence now acquired seems to indicate that a tuberculized race would be safer when its first infection is received in middle and later childhood and outside the house, than when this occurs in infancy and in the home environment.

Dr. Hart concludes that periodical surveys of the tuberculin reactions of the general population of large cities would provide indications of the efficacy of measures taken by the State to reduce the spread of infection, such as the control of open tuberculosis, the protection of young children from exposure to the disease, the pasteurization of milk, and the improvement of environmental conditions. Furthermore, such surveys would make it possible to construct charts showing the ratio of the tuberculosis death-rate to the tuberculin sensitization incidence at each age. The comparison of such charts in various places and at the same place from time to time should give evidence as to the optimal age-distribution of tuberculous infection.

Clinical and other Notes.

A NEW ANÆSTHETIC APPARATUS.

By Major T. SCOTT LAW.
Royal Army Medical Corps.

THE accompanying photograph illustrates a new type of portable endotracheal ether, chloroform, nitrous oxide and oxygen apparatus which has been made to my own design. The instrument consists of one large tank with a closed compartment fixed on the inside into which ether supplied through a drip feed from a reservoir on top can be volatilized by means of hot water in the body of the tank. This tank holds about two pints of water and is provided with a lid.

The reservoir with supporting column can be disconnected at its junction with the larger tank, and carried inside the latter when not in use. In the supporting column is a small glass window through which the ether drip, controlled by a large milled screw, can be seen. Passing up the side of the drip feed is a narrow tube which extends from the lower end of the drip feed to above the upper level of the ether in the reservoir to stabilize the pressure in the reservoir. In addition, an air vent is placed in the screw cap, which is removed for filling the reservoir. By this means the pressure in the volatilizing compartment does not interfere with the drip. The reservoir holds fifteen ounces of ether and can be carried full, no leakage resulting if the screw cap is screwed down to its full extent.

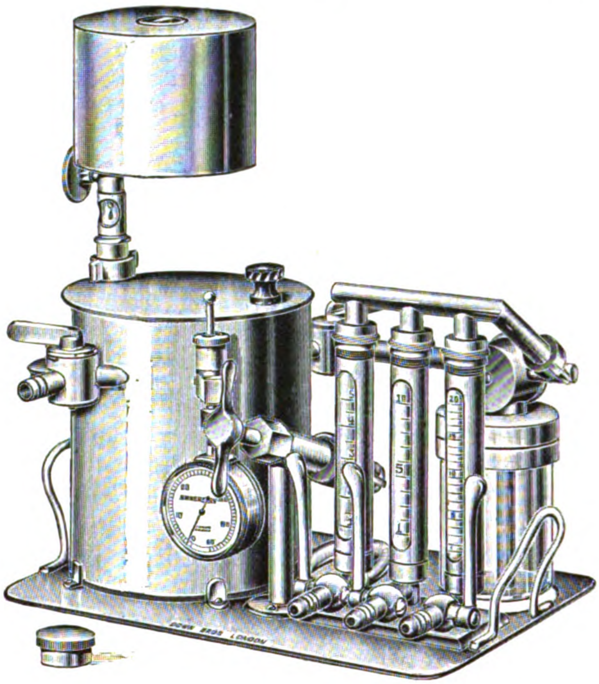
The glass flow meters, three in number, and each enclosed in an open metal column, are arranged for the administration of oxygen, nitrous oxide, and carbon dioxide, whilst inside are floats coloured red, black and green respectively, so that confusion cannot occur when connecting up these flow meters to their respective cylinders.

The carbon dioxide flow meter has an additional "in-flow" to allow carbon dioxide to be administered from a sparklet bulb. The bulb is mounted on a rigid column and controlled by a handle. Graduations on the glass tubes are 1 to 10 for oxygen, 1 to 20 for nitrous oxide, and 1 to 5 for carbon dioxide. The inside diameter of these glass flow meters is greater at the top than at the bottom, and the level of the floats as shown by the graduations indicates the volume of gas passing to the patient in litres per minute.

The chloroform bottle is placed behind the flow meters, and is fitted so that oxygen can be made to bubble through the chloroform if required. A stop cock is placed on the top of this bottle in such a position that it is impossible to administer chloroform to the patient accidentally. The stop cock must be turned by hand. The chloroform bottle has a capacity

of about four ounces, and has to be unscrewed for filling. It is never necessary to have more than one and a half ounces of chloroform in the bottle.

The tube leading to the volatilizing chamber is fitted with a "by-pass" which encircles the outside of the warming tank for three-quarters of its circumference, and is controlled by two taps marked "tank" or "by-pass," and which must be operated together. Any of the gases in use, alone, or in combination, can be administered to the patient when both taps are turned to "by-pass." When turned on "tank" warm ether vapour will be administered when ether is dropping from the reservoir. And a pure



chloroform or chloroform and ether administration can be adopted at the wish of the anæsthetist.

By allowing the gases to pass on the outside, the slowing down in the flow of gas, which is so noticeable in administering gas and oxygen when it has to pass through the warming chamber, has been obviated, and at the same time ether vapour is suddenly cut off if it should be desired to give only oxygen or carbon dioxide.

A manometer and safety valve, arranged as one unit, are placed in front of the large tank and register and regulate the pressure within the ether volatilizing chamber to which it is connected. The safety valve should be adjusted to "blow-off" at a pressure of four millimetres.

A screw cap with spring attachment fits over the inlet to the volatilizing

chamber when the instrument is not in use, and keeps the lid firmly in position for transport.

The outlet from the volatilizing chamber is situated on the front of the large tank, and either a flexible metal tube with rubber connections or a wide bore rubber tube is used to connect to the intra-tracheal catheter in the patient.

A Magill's rebreathing bag can be fitted on this tube for ether and oxygen administration, but should be shut off when it is desired to give chloroform, etc., to the patient, and certainly when these are being administered by way of the "by-pass."

It will be seen that the more rapid administration of oxygen, gas and oxygen, etc., is an advantage.

In constructing the apparatus, I endeavoured to reduce the amount of breakable glass parts and to lessen the amount of rubber tubing which deteriorates and requires replacement. The disadvantage of having to pump over ether from a bottle into the volatilizing chamber by means of a bellows has been removed, and, once started, more automatic working is permitted. The ease with which the "by-pass" allows the rapid administration of gas and oxygen is obvious. The large water tank ensures complete volatilization of the ether and the maintenance of a supply of warm ether for a longer period. The possibility of carrying the ether reservoir inside the large tank renders the instrument portable. The apparatus is mounted on a metal tray, and measures 11 by 6¼ by 6 inches; the weight is 12 pounds. Messrs. Down Bros., London, are the makers, and I wish to express my grateful thanks to them for their valuable co-operation, and my appreciation of their faultless workmanship.

THE DEATH OF AN ENTAMŒBA.

By Captain M. F. N. GRIFFIN.
Royal Army Medical Corps.

I was called from the wards to examine the stool of a man who had been admitted to hospital two days before with acute dysentery. I had seen a specimen of his stool on the previous morning, and it had been a typical bacillary exudate; large numbers of polymorphonuclear and mononuclear cells were seen, with no normal fæcal matter, and nothing resembling an amœba was present.

When I examined the specimen I found that it contained large numbers of motile amœbae. It had been passed about an hour previously. One large entamœba in the middle of the field was particularly active. It contained from fifteen to twenty red blood-cells, a small nucleus, and clear highly refractile ectoplasm. It varied from thirty to forty μ in length, measured in its longest diameter. I observed this specimen for the next two and three-quarter hours at intervals of ten minutes or quarter of an hour. As

the specimen had been passed nearly an hour before I looked at it, the organism showed movement for three and a half hours outside the body. The active flowing movement first seen continued for two hours. The only noticeable change was that the whole organism became smaller and the red cells disappeared one by one until at the end none was left. The movement then became slower, and when it had nearly stopped altogether a new motion started; this was a rapid pulsating movement which only lasted for about five minutes. The organism then showed a little more sluggish movement and the cytoplasm became granular. The whole cell, now eighteen μ in diameter, was round in shape with one small protrusion of cytoplasm, and thus it remained, presumably dead.

The following points are of particular interest :—

(1) The length of time the organism lived outside the body—three and a half hours. This was presumably partially due to the number of red cells ingested, and also to the heat of the laboratory, about 90° F., on a damp sticky day. Other specimens in the same preparation showed no movement after two hours.

(2) The sudden change from an amœbic to a pulsating movement, and the short duration of the latter stage.

(3) The presence of *Entamœba histolytica* in a bacillary exudate. Repeated efforts were made to isolate dysentery bacilli from this case, without success. But the possibility of a mixed infection must not be overlooked.

This is not the first time I have found *E. histolytica* with a bacillary exudate.

The history of the case from which the organism was obtained is briefly as follows :—

Trooper W., aged 24, had three years' service in India. After he had been in the country a few months he was admitted to hospital with blood and mucus in his stools. He was given salts and was discharged fit in two days. He did not report sick again until his present admission. He states, however, that he never felt really fit, as he was always tired and in consequence he played no games, although he had been very keen on football when at home.

REPORT ON THE USE OF NEMBUTAL.

By Major J. W. LANE.

Royal Army Medical Corps.

I have given a fairly new drug, nembutal (a barbiturate), obtainable from E. H. Spicer, Ltd., Watford, Herts, to about twenty of my parturient patients with most pleasing results. I was giving three, but now give four capsules (easily swallowed by most patients) when the os is three-fifths dilated—or when the patient is obviously in the second stage. Within

fifteen to thirty minutes the patient is asleep, between the pains. She groans during pains, which are not lessened in frequency nor strength; in fact, in two very nervous patients my Sister in charge of the maternity ward and I thought that the pains became more powerful under the nembutal. Labour progresses normally, and the child is not asphyxiated but cries lustily when born. The patient usually sleeps for about four hours after the child is born, and when she wakes has no memory of the birth.

This drug seems to me to offer obvious advantages as compared with hyoscine and morphia, or inhalation anæsthesia, during a normal labour, and *if* a deeper anæsthesia is required for instrumental delivery, or rotation of an occipito-posterior, ether (preferably) or chloroform can be given after the nembutal, but in smaller quantities than without nembutal.

At first I watched the patients under nembutal with some apprehension, but I found little or no change in blood-pressure, pulse or respiration from the normal. Certainly in two cases where the nembutal was given very late in the second stage the patients did not seem to be well under the influence of the drug, but even in these two there was no memory on wakening of the birth of the child.

It is possible with shouting to penetrate the consciousness of the patient, but little help can be expected from her. One of the earliest cases I had impressed me greatly. She was asked the morning after her confinement how she felt after taking the nembutal and if she had much pain. She said she very soon felt no pain, but felt much stronger and could feel something coming down and out. She was the only patient who made such a statement. As I have said before, most of them had no memory of the birth of the child.

I have also used nembutal in three cases where I wished to do a bimanual examination of the uterus; the patients were very nervous or had complained at the out-patient clinic that they were being hurt. One of these, one and a half hours after receiving three capsules, did not seem to be much affected; in fact was only drowsy. But I examined her with very little difficulty; without the nembutal it was impossible to examine her. Another case of bimanual examination was heavily asleep in twenty minutes, and slept on for twelve hours; and twenty-four hours after administration felt doped. She also had three capsules.

In connection with this last point, I have not found any feeling of being doped the morning following a night's sleep obtained by one nembutal capsule.

In cases of insomnia caused by worry or anxiety, ordinary narcotics are notoriously uncertain and slow in action, and the patient feels drowsy and doped the day after and not fit for work. I think nembutal (two capsules) with its quick action and early elimination should be of help in these conditions.

Lastly, I have tried nembutal as a pre-anæsthetic and as a sedative the night before operation. I have not had enough experience of this use of

the drug to feel justified in giving an opinion of value; but I can say that I have been satisfied with the results so far. I have been giving two capsules the night before, and two one hour before the operation.

I hope that my experiences with nembutal will cause other medical officers to give it a trial, and report their results in our Journal.

A CASE OF ACUTE BACILLARY DYSENTERY IN ENGLAND.

By Major S. J. L. LINDEMAN, M.C.,
Royal Army Medical Corps.

During December, 1931, in Dorset, I attended an officer's wife for abdominal pains and diarrhœa. This lady had been in India, but had returned from abroad more than four years ago, and gave no history of ever having had dysentery or severe diarrhœa. The symptoms were thought at first to be due to some dietary indiscretion, and the usual castor oil with starvation was prescribed.

The next day she said that the diarrhœa was worse and was accompanied with severe griping pains and tenesmus, and she had seen a little blood in the stools. She seemed quite ill; temperature 102° F. and tongue furred. There was tenderness all along the colon. A stool was inspected and found to consist almost entirely of blood and mucus. Under the microscope a profuse cellular exudate was seen.

A specimen was sent off to the laboratory by post with a note that this was clinically a case of bacillary dysentery. Unfortunately the specimen was sent off at the week end, and the delay in the post did not give the laboratory much chance of isolating an organism. The report came back that it was undoubtedly a case of bacillary dysentery, in spite of the country of origin. Meanwhile the patient was not responding readily to saline treatment, and as she was really ill and in need of careful nursing she was sent into the local hospital. From here fresh specimens were sent to the civil laboratory, which succeeded in isolating a Flexner organism.

After three weeks in hospital the patient recovered.

It is interesting to consider whether this was a fresh infection or whether it had been bottled up for four years since her return from the East.

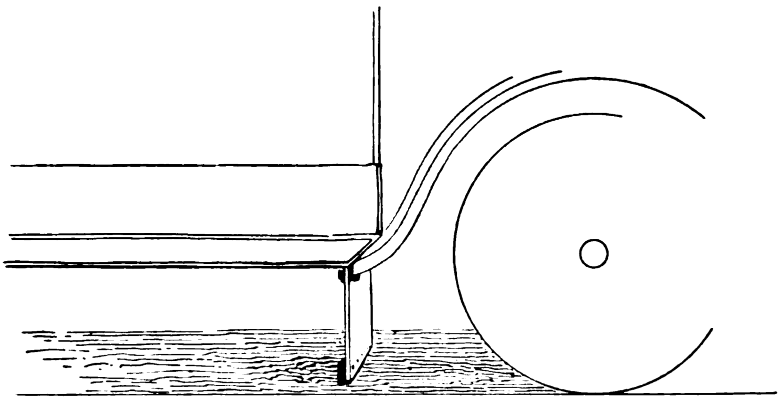
BULLOCK-SHOE PUNCTURES.

By TOTEM.

In an entertaining account of 1,200 miles travelling in India, Major L. B. Clarke draws attention to punctures due to bullock shoes. Having been a sufferer from the same cause, I can sympathize with him. Nine major gashes in six months, the last a complete bullock shoe through and and through a brand new tyre and tube, somewhat marred one's enjoyment

of touring by road, until a happy inspiration produced the device described below.

The puncture is caused by the front wheel elevating the dormant half-bullock shoe and setting it up on edge, so that if the car is travelling fast enough the back wheel arrives on the vertical shoe before it has time to fall again. The anti-puncture device consists of a vertical flap of stout leather with a heavy metal strip along the lower edge, or a metal flap is more effective but more noisy. This flap is secured under the running board on each side, close behind the front mud guard and in the position of a mud flap. It must nearly reach the ground, i.e., there must be not more than a one-inch clearance with the car loaded to the normal touring weight. When travelling fast this flap tends to blow back and lift from the ground



Anti-bullock-shoe flap. A leather flap with heavy metal strip riveted at the bottom edge on the posterior surface. The flap can be fastened to the bolts of the running board, or on a strip of wood screwed beneath the running board, in which case it should be slightly offset outwards.

just at the time when it is wanted close to the ground. Therefore it must be heavy and set low. If set right on to the ground it raises massive dust clouds.

The flap functions by knocking flat or to one side the raised bullock shoe. In fact, one can frequently hear the impact, and I have had flaps ripped in pieces on an apparently clear road.

After fitting these flaps I have had two years' touring, of about 35,000 miles, with only one serious bullock-shoe cut, acquired on a very dusty road. Many officers have copied this device and found it most useful.

I forward this note in the hope that it may prove equally useful to others in the Corps who have to do much road travelling in areas infested by the bullock shoe.

Travel.

BY RAIL AND ROAD IN INDIA.

By Major L. B. Clarke.
Royal Army Medical Corps.

(*Continued from p.* 306.)

III.—The North.

The conclusion of a six months' leave found one embarking again for India. A pleasant outward trip on the P. and O. mail boat was devoid of any special happenings. The company on board was of interest; civil and military officers and their wives returning to India, tourists *en route* to Australia, the Whitley Labour Commission, a Dominion Governor, and many people whose names are household words.

The ship moored at Ballard Pier in the middle hours of a soft tropical night. Sleep was impossible, and, clad in pyjamas, one watched the mooring arrangements. Fifty coolies sprang to life on one side and fifty on another, each hauling on to the hawsers which hoisted the gangway to the ship's side.

Below the lengthy building of the Post Office, now being illuminated and prepared for the reception of the mails, was seen a vast quantity of old mail bags, but yet dimly perceived in the all-pervading gloom. Gradually in mysterious fashion from beneath first one and then another appeared a moving arm or leg and steadily the long heap of mail bags assumed life and, with clearer light, was found to be sheltering for their night's lodging vast numbers of coolies, all waiting with the philosophic resignation of the East, to man-handle the mails.

With the blinking of an eye, the stretching of an arm or leg, the removal of an occasional parasite, their toilet was complete, and they were ready for the duties of the day.

A local mail was received on board for incoming passengers, and after a tedious wait in a long queue outside the Purser's Office, an advertisement from a Poona money-lender was safely placed in one's hands.

The journey northwards from Bombay to the Punjab was by the Frontier Mail. India's fastest train, which performed the 1,342 miles in thirty-nine and a quarter hours. The north of India is always spoken of as the real India and is associated with wild open country, rolling plains, great mountain systems, a virile and manly race, great irrigation works and a real cold weather. Most of one's preconceived ideas materialized, and as the train sped northwards the country gradually assumed a different aspect.

Gone were the palm trees and thick vegetation of the south, the squalid hovels of the Mahratti and Gujerati peasants. Here instead were great open stretches of dead flat country, the landscape punctuated by occasional isolated trees, odd towns of a new and peculiar architecture with flat-topped roofs, solidly made and compactly clustered within the crumbling ramparts of some ancient fort, an occasional mosque with domed roof, a graceful minaret, strong and powerful looking workers in the fields, vigorous and healthy cattle, and slow, swaying and cynical camels.

At noon on the second day Delhi was reached and away in the distance could be seen the skyline of the great new city which has become the capital of India. Quantities of dust entered the carriage, far worse than that of the Canadian Prairies, till the floor assumed the aspect of wind-blown sand on the sea shore.

At night Lahore, the capital of the Punjab, the temperature cooler, and in the early hours of the morning the coach was shunted off the Mail Train and daylight found us in a siding at the station of Rawalpindi.

Orders had been received to proceed straight to one's hill station in the Murree Hills as the hot-weather season was not yet over. The morning was spent in official calls, arranging for a taxi, and lunch in the Mess. Soon afterwards was commenced a rapid run up to Murree, with a climb of over 5,000 feet, and here, indeed, was a new experience. One had seen the gently rolling downs of the Nilgiris, whose very extent had concealed the idea of altitude, but here one soon realized that people lived on mountain tops, on narrow ridges of ground, 7,000 feet or more up, with steep precipices on each side, and where the only flat places are those which have been made so artificially for the accommodation of troops, families and football grounds.

The road to Murree is part of the Kashmir Road; the surface and width are excellent, the gradient easy and with increasing height, the landscape assumes a more and more beautiful aspect. There are many military stations in the Murree Hills tucked away in the remote recesses of mountain tops and the road to the Galies, as these small stations are called, is picturesque, narrow, bumpy and of steep gradient. One's first experience was of engrossing interest. A winding track through extensive woods, with the slanting rays of a western sun casting long shadows through the trees, a drop of 500 feet to a narrow col, and then commence a steep ascent of 1,000 feet in bottom gear.

Here steep valleys drop a thousand feet from the very edge of the road, close at hand to the left are the irregular slopes of a pine-clad hill, and away in the far distance to the right can be seen chain upon chain of blue mountains culminating in the superb snow outline on the Pir Panjal Range bordering the famous Vale of Kashmir.

On a clear day, to the left of this extensive sky line, can be seen standing out in marked isolation a lofty mountain covered in perpetual snow, Nanga Parbet, one of India's highest peaks. Younghusband in his book on

Kashmir [1] considers this scene from the Murree Hills to be one of the three great Himalayan views. Inaccessible and unclimbable, Nanga Parbet stands out a giant among lesser giants, and its 26,600 feet do not appear unduly dwarfed by its 120 miles of distance.

One's destination was reached before dusk and there was sufficient light left to realize that one's summer quarters for the next two years would be in a pleasant place. A large and comfortable bungalow with an English-turfed lawn in front falling gracefully to lower levels, a wide sweep of pine trees on each side, two stately Himalayan oaks in the centre, and between the two belts of pines, an uninterrupted long distance view of Pindi and the plain.

Behind were two other stations, reaching a height of 7,700 and 8,500 feet, where duty would take one from time to time. Close to the latter station was seen a dak bungalow perched on a narrow projecting spur of rock which looked as though at any moment it might slip down the 3,000 feet of cliff below.

A stay of twelve days was made to learn the lie of the land in readiness for the following year, and one returned to Pindi for the commencement of the cold weather.

Here in Westridge, a western suburb of Pindi, lying just off the Grand Trunk Road, one settled down and awaited the arrival of the car from home. In the meanwhile stock was taken of the situation and a modest but expensive staff engaged. The bearer, a Punjabi Moslem, had met the boat at Bombay, an old pock-marked retainer of the Mess and quite a good servant. His customary form of address was "Sir." If however he desired to discuss anything out of the ordinary, such as minor complaints against the other servants, he would address his master as "Your Honour." On the less frequent occasions when he had something of prime importance to request, such as an advance of pay, his remarks would be prefaced by the title "My Lord," with emphasis on the first word. Unfortunately, after a year he had to be dismissed as he did not see eye to eye with his colleagues, and quarrels and bickerings became frequent.

A long delay of six weeks occurred before the car arrived from home, twenty-eight days of which it spent in a "fast" goods train between Bombay and Pindi. In the meanwhile, frequent visits to Pindi were made by tonga, an ancient type of vehicle resembling a low-covered dog-cart and drawn by an animal somewhat resembling a horse. They are much in favour in northern India on account of their cheapness. They have no other claim to popularity and are highly dangerous contraptions from which frequent falls may occur. The animal may take fright and overturn the vehicle, or slip on the smooth tarred surface of the Mall. In each of these ways one fell out in the course of ten days, once in front and once behind.

With the arrival of the car much ground was covered, partly on duty and partly on pleasure. Official tours to Jhelum and Abbottabad, 68 and

75 miles respectively, inaugurated many miles of travelling in Northern India.

The Grand Trunk Road, running from Calcutta through the important towns of the Gangetic Plain, passes in the north through Delhi, Lahore, Rawalpindi, Attock and Nowshera to Peshawar, where it is continued westwards through the Khyber Pass to the Afghan Frontier, and so on to Kabul. This great and historic highway, immortalized in Kipling's "Kim," has been the scene of countless comings and goings, of armies on the march, invaders advancing southwards and defenders northwards, and at many places on the way have been fought battles which have decided the fate of many a ruler and many a nation.

Fig. 1.—Attock Fort.

In the Punjab Plain the ground is for the greater part well surfaced and the gradients are easy. Let not the uninitiated think that because one speaks of the Plain, that therefore the road is level. It is for many miles, but frequent elevations of land in the northern part are encountered, rising in places almost to the height of a mountain at home, and these have to be negotiated very often by long and winding climbs. Again, a common feature is a five-mile rise of gradual ascent followed by a similar descent, then a bridge over a river or dry nullah, another similar rise and fall, and so on for mile after mile. Fast timings can be made, far more so than at home, for the traffic is light, just an occasional bus, a car or two, or a jumble of dazed and lethargic cows. Bile carts are few and far between in these parts, and the punctures of the south caused by bullock shoes are almost non-existent, in fact 5,000 miles of Northern India, mostly on the Grand Trunk Road, were done before the only puncture.

A four days' leave in the early Spring enabled one to visit Peshawar (106 miles) and the Khyber Pass. The road runs first to Attock, an ancient town whose Fort is perched on a dark coloured rock overlooking the deep ravine of the Indus River. Beyond is the important road and railway bridge, the only crossing for many miles. The river is the boundary between the Punjab and the North-West Frontier Province. On the other side the road is good, long avenues are passed and white marks on the trees at the level of one's head indicate the height of the recent floods.

Next comes Nowshera, with a long straight road passing through an extensive cantonment. Here a halt was made for lunch at one of the messes, and the journey resumed in the late afternoon. Miles of orchards are traversed, and then Peshawar City and Fort come into view on the left and one arrives in the cantonment, where a scene of colour meets the eye. Here are beautiful gardens well laid out with a profusion of brightly-coloured flowers, a marked contrast to the dust and dryness of the long run from Pindi.

The next day was spent in sightseeing and purchasing various local curios and wares. Peshawar is the *entrepôt* for practically all Central Asia, and contains many attractive articles, carpets from far-off Turkistan, and gold and silver and brass ornaments from many a distant bazar, all brought down through the Khyber Pass by camel convoys. The city is also noted for its wax cloth, that is to say, black cloth decorated with coloured wax in various designs, the effect being that of gold thread work, and one looks in vain for signs of stitching behind the fabric. These are artistic and cheap.

In the evening one was joined for the rest of the tour by an officer from Nowshera, and a short run was taken over the wild desolate country towards Kohat, but stopping short of tribal, i.e., unadministered territory.

On the following day, accompanied by driver and bearer, we made an early start for the Khyber, and in a short time Jamrud Fort was reached. The Fort has the appearance of a battleship, and here the toll road commences and one signs the book. From now onwards two roads, one for cars and the other for animal traffic, proceed the entire length of the Pass. The road continues westwards, the country is dry and barren, there is much rock and scrub, and here and there in dead flat country a meandering dry nullah indicates the course of some temporary stream.

The entrance to the Pass is not very noticeable till one gets fairly close, and for some distance back conjecture had been rife as to where exactly a road could possibly penetrate the mountain barrier looming up ahead, for it stretched from one horizon to the other without a break. A narrow U-shaped gap is found, and through this enter the two roads and the railway, which now becomes our near companion.

The hills on each side are rugged and absolutely barren ; scarcely a blade of grass relieves the monotony of a wild and inhospitable country. A gradual ascent takes one into the heart of the Pass. The width of the valley varies from a few yards, where there is hardly room for the road and

the railway has to tunnel its way through the hills, to wide open spaces often half a mile wide where occasional walled and fortified villages with look-out towers like truncated windmills tell their tale of a wild and lawless people, now happily engaging in, but probably not enjoying, one of their periods of quiescence.

Winston Churchill [2], in his recent book, sums up very accurately the people of these parts when he says that their perpetual vendettas were most markedly affected by two events of the nineteenth century: the introduction of the breech-loading rifle, which enabled them to fire on their enemies without even leaving the security of their own houses, and the gradual approach of the British Raj, which they regarded as an unmitigated nuisance.

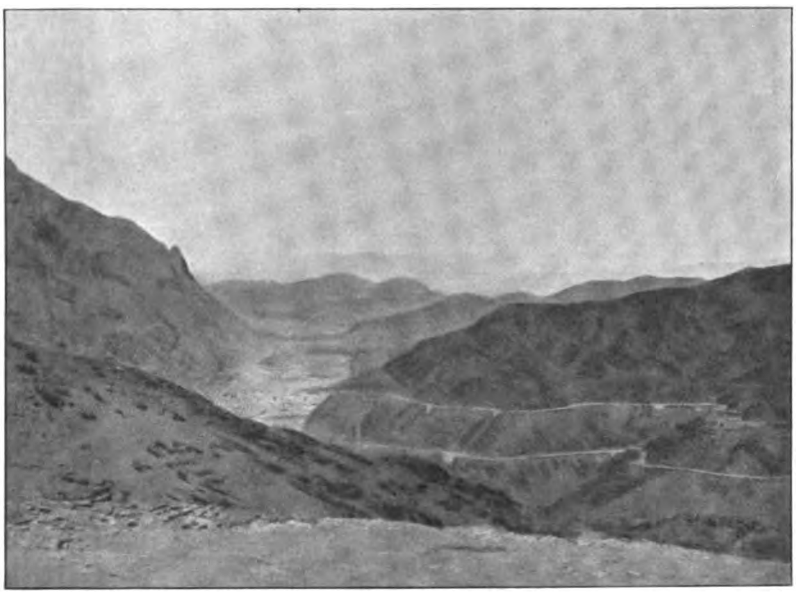


FIG. 2.—Looking into Afghanistan.

The road climbs up higher and higher and then reaches Landi Kotal, truly one of the outposts of Empire. Here the trains reach their terminus. The road continues downhill in zigzag fashion for about three miles, when a closed gate indicates the limit to which the ordinary traveller is allowed to go. The car is parked alongside a khassadar's post, and one walks towards the edge of a steep declivity, when suddenly one sees far down below a scene of dramatic interest. Steep and rugged hills form the framework of the picture; in the middle is the last frontier post, that of Landi Khana, and just beyond on a continuation of the road is a small square white house, the customs house of Afghanistan. To the left, the road to Kabul can be seen turning off in a deep valley, and beyond rise tier upon tier of wild forbidding mountains leading into the heart of the Amir's

dominions. Such, then, is the view into Afghanistan, and here in this northern gateway of India have been enacted, in times past, deeds which have reverberated throughout the Empire.

A picnic lunch was taken on a spur of rock overlooking this famous scene, and comment was made on the absolute peace and quietness of the place; not a sound disturbed the air, not a bird nor an insect conveyed a sign of life, merely the occasional muffled cough of the khassadar leaning out of his look-out tower as he surveyed the scene. Then suddenly and dramatically came a most deafening sound, echoing and re-echoing through the valley, and all the past of the Khyber came crowding into one's mind. It was merely a runaway army mule-cart which had got out of control, and

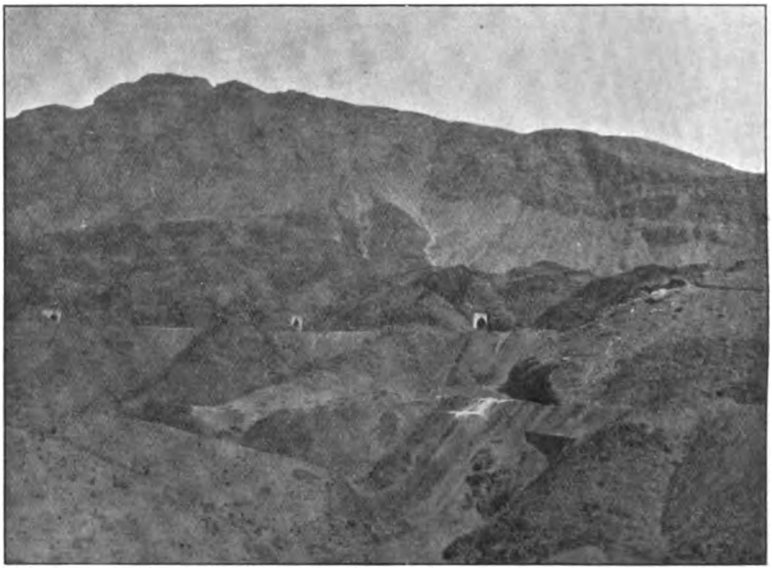


FIG. 3.—Tunnels in the Khyber.

with increasing speed was rushing headlong down the winding and precipitous road to Landi Khana. We watched the mad career of these two excited animals, and at every sharp corner we expected to see them fall hundreds of feet into the valley below, but there is no accounting for the ways of the army mule, and, as far as field glasses could reveal, they arrived safely at their destination. The driver did not appear on the scene at all. Probably, with a cunning almost equalling that of his mules, he had foreseen events and jumped off while the going was still good.

On our way back we drove through the camp of Landi Kotal and, intending to work our way back gradually to the main road, found ourselves five miles from the camp on the wrong road and leading upwards into tribal territory, or at least we thought it might be, and made our way discreetly back to the camp and so to the road we knew.

We returned to Peshawar by dusk, and were satisfied that we had seen the Khyber and under perfectly good conditions. Our gratitude to fate or luck was more strikingly felt a fortnight later, when two bankers had been foully murdered by an insane khassadar at the very spot where we had had lunch, and again a month later, by which time the Afridis were in Peshawar, facts of recent history which in this place call for no comment.

Another interesting trip was taken during the first cold weather, and this was to Taxilla, the old buried Græco-Bactrian city dating from pre-Christian times. No records existed in India, but from Greek sources it was understood that somewhere between Pindi and the Indus was at one time a city of great importance. Determined efforts, aided by Greek records, led to the discovery of a series of buildings covering an area of about twenty-five square miles.

Tucked away in deep ravines or else on the sloping sides of some rocky hill are the excavated remains of numerous Buddhist temples, and nearer at hand, close to the modern town of Taxilla, are the very extensive remains of the chief city. One climbs an embankment and looks down on to a scene of much activity, hundreds of coolies digging away the earth, a town with the lid off, for all the roofs are demolished, and one looks down into vast numbers of single-storied dwellings, narrow straight paved streets in parallel and rectangular fashion, and one pictures oneself back in Pompeii, beneath the shadow of Vesuvius.

Here, however, no volcano had brought to an end a great civilization; merely accumulated earth to the depth of eighteen feet, produced by the dust storms of twenty-two centuries.

The royal palace, the seat of government, the university, and the medical school have been unearthed; the city so far revealed measures about half a mile by a few hundred yards, and there is still much to be brought to light, and hundreds of coolies are working daily in a steady and systematic manner. A photograph was taken. The overseer informed one that it was forbidden as the copyright lay with the Archæological Department of the Government of India, but as a promise was made not to publish he did not persist in his demand to destroy the film. He need not have worried, for later on a snapshot of modern Taxilla was taken, and as in the excitement of the moment the winder had not been turned on, two pictures were taken on the same film, each mutually destroying the other.

Finally, a visit was made to the Museum and one saw, in a fine and modern building, rare examples of the potter's and goldsmith's art, relics unearthed from the buried city. It is recorded that Alexander of Macedon stayed in Taxilla. He was received with much ceremony, stayed many months and, leaving the King of Taxilla as his Viceroy, continued his celebrated journey southwards to the Hydaspes [3].

With the onset of the hot weather one's thoughts turned again to the hills, and by the first week in April one was again installed in the pleasant surroundings already described.

The staff had to be augmented and it seemed surprising that a simple establishment in India required so many servants. Those who have never been in this country may be interested to know the details, others may conveniently skip the next paragraph.

First it should be understood that the Indian servant is often precluded by custom, prejudice, religion or laziness from doing certain forms of duty, and he prefers to stick to his own particular job. The most important member of the staff is the bearer, who acts as valet, makes the beds, and generally supervises the establishment. He may with increased emolument act as butler. He then becomes that important individual known as a khitmagar, and wears round the waist of his white cotton uniform a belt of one's regimental colours, and on a similar cloth on his turban an extra large-sized regimental crest in gilt. The next is the khansama, or cook, who does the catering and purchases the food. Then comes the masalchi, or washing-up boy, for no cook washes up in India. Then the bhisti, or water carrier, who prepares the hot bath and carries all the household water from the outside tap or well. Further, the mali who looks after the garden. Then the chaukidar, or night watchman, who, with the inevitable guttural cough, guards the house at night; he is aided in his duties by some sort of tacit understanding with the local thieves, so although his duties are largely nominal he does fulfil a definite purpose. This is the normal establishment, but in addition everyone has to employ a dhobie, or washerman. This is the gentlemen with sibilant explosions who, through constant practice in breaking stones in one's shirt on a hard rock, succeeds in altering the geological conformation of the country and the major anatomy of one's most intimate garments. In addition, one had to have a driver for the car, a syce for the horse, and a grass cutter to cut grass for the horse. Lastly, a patrol, or day chaukidar, was employed to police the compound and prevent it being used as a highway by the local paharis (hillmen). Such then was the establishment employed throughout two years.

A word regarding the grass cutter. A stranger was seen one day cutting grass on the lower part of the lawn. The bearer was summoned. "Who is this gentleman?" "Grass cutter, sir." "What is he doing here?" "Cutting grass, sir." "What for?" "For horse, sir." "Whose horse?" "Sahib's horse, sir." "Oh, so this is the man who supplies grass for the horse and he is actually selling me my own grass at 12 rupees a month?" "Yes, sir." A downward adjustment of his month's bill was promptly effected.

The khansama was an excellent servant and a man of many parts. He had a go of malaria one day. Quinine in the usual ten grains to the ounce was ordered and twelve doses sent to his quarters. Next day after breakfast he paraded and asked for some more quinine What had he done with the twelve doses he had yesterday? Drunk it. Drunk it all? Oh yes, very good quinine for fever. He was asked if he were deaf? No, he was not. Were his ears buzzing? A little bit buzzing . . . and so one was left

with the therapeutic phenomena of a very small-sized man who had consumed 120 grains of quinine in twenty hours.

On another occasion, again after breakfast, and after the daily settling of the accounts, he said he was not well. On closer look he certainly appeared ill. His eyes were red, his face suffused, and he bore all the evidence of a severe cold. A discussion then took place as to how he might have contracted the cold—the weather, the condition of his quarters, the possibility of rain finding its way through a leaky roof, the chance of a chill on one of his frequent bazar visits to Murree—all these seemed to meet with negative response, so he was finally asked the direct question as to how he thought he had contracted it. "Think it was because up in night." "Oh, so you were up in the night. Now what was the cause of your being up in the night?" "Family had baby." Wives in purdah in India are never referred to as such, in fact it is not polite to refer to them at all, and this was his method of breaking the news that his wife had given birth to a baby in the night. The explanation for this indirect announcement lay, of course, with the sex of the child, for it was one of the many thousands of unwanted females which are born annually in India.

The syce also was a gentleman of parts. Late one evening, after paying out the usual monthly pay for the staff, it was discovered that this man was not to be found anywhere. Usually they collect like flies on a hot day at the very suggestion of money, but somehow he was absent. The bearer was asked, "Where is the syce?" "The syce, sir, he is dining out." Pictures of the syce in bow tie and long tails immediately cancelled out his remissness of attendance.

The summer months, there are seven of them in India whatever number there may be at home, passed pleasantly and quickly. Officers from the plains were accommodated from time to time, the house was never empty, and dinner and tea parties, tennis tournaments and walks over the hill-sides took place, and with the excellent climate of the hills, one kept remarkably fit.

With social diversions, as relaxation from work, one was fully occupied. As regards work, conditions are very different in the hills, both from those prevailing in the larger stations of the plains and also from those at home. Many diverse matters have to be attended to, from the vagaries of the families, about which much could be written, to the mass of routine office work and correspondence. The former subject has been ably depicted by "Ola" [4] in "Our Station," which appears to bear close geographic and ethnographic relation to the present one.

With approach of the cold weather a move was made back to Pindi, and the numerous servants, all one's household effects, a car, a horse, a dog and a monkey, were transported back to Westridge without accident or incident.

[References will be printed at the end of the article.—Ed.].

(To be continued.)

Current Literature.

HUNT, BRUCE. **Bedside Blood-Sugar Estimation: a New Clinical Method.** *Med. Journal of Australia*, 1931, ii, 782.

The author states that this method, the Crecelius-Seifert colorimetric process, for carrying out blood-sugar estimations can be adopted at the bedside of the patient. It is speedy and requires no technical skill.

The apparatus required for the method is as follows :—

Colorimeter (Zeiss); capillary blood pipette and precision tube (both supplied with the colorimeter); two graduated pipettes of 1 cubic centimetre and 2 cubic centimetres respectively ; one 1 cubic centimetre pipette ; filter funnel and paper ; a few small test-tubes ; sodium hydroxide ten per cent ; picric acid 1·2 per cent aqueous solution ; gas or spirit lamp.

As in other methods, the capillary pipette is filled with 0·2 cubic centimetre of blood which is expelled into a small test-tube containing 1·8 cubic centimetres of distilled water. The pipette must be completely emptied. After adding 1·2 per cent picric acid solution to the test-tube containing the laked blood, the mixture is well shaken and then filtered through paper. About 1·5 cubic centimetres of filtrate are obtained. Ten per cent. solution of sodium hydroxide is added to the filtrate in the proportion of one part of the former to ten parts of the latter. In practice the author has found that the addition of 0·15 cubic centimetre sodium hydroxide gives sufficiently accurate results. The mixture is then heated until no further colour change occurs. It is sufficient to bring the fluid just to the boil two or three times. The fluid is allowed to cool and then poured into the precision tube, which is placed in the colorimeter. The matching of the colour must be done within five minutes of the heating and the result read directly from the scale in the apparatus.

The whole procedure can be carried out in eight minutes.

It is stated that five observers, new to the method, obtained results which in no case varied more than 0·01 per cent from the author's reading. This implies very small variation in results, inherent in all colorimetric methods, introduced by the personal factor.

The author carried out thirty-five estimations by the Crecelius-Seifert method and controlled each one by a parallel estimation by the MacLean method. The bloods in both tests were taken within two minutes of each other. The colorimetric results were in all cases recorded before those of the MacLean tests were known. The nature of the lighting apparently does not affect the accuracy of the results to any appreciable extent, as the estimations were carried out in daylight and artificial light.

A comparative table is given of the results of the 35 consecutive cases

estimated by the Crecelius-Seifert and MacLean methods. In 6 the results corresponded exactly, in 16 the colorimetric result was higher, and in 13 the MacLean result was higher. The difference in the results in 32 cases out of 35 was not greater than 0·03 per cent, and in no case was the difference greater than 0·045 per cent; the mean difference was 0·018 per cent.

The author states that in no case was the discrepancy between the two results sufficiently large to leave any doubt as to the clinical state of the patient or as to the appropriate treatment.

The adoption of the method in routine diabetic work is advocated, except in those cases in which a very precise evaluation of the blood-sugar is required; the degree of accuracy attained by this method is not sufficient for such work as the carrying out of the lævulose tolerance test, for which the more accurate methods of MacLean, etc., must be used.

PETRA, OSIPOVICA-GANCA. **A Portable Bacteriological Field Laboratory.** *Vojno-sanitetski Glasnik* (*Review of Military Medicine*, Yugoslavia), 1931, ii, 605.

In this article there is a description, with illustrations, of laboratory equipment arranged for easy transportation and of the setting up of a portable field laboratory.

The whole equipment is carried in two wooden cases, each measuring 61 by 71 by 98 centimetres, i.e., approximately 24½ by 28½ by 39 inches. The two cases when opened out form tables with shelves and a working table with a knee-hole. Two folding tables and two chairs are carried; also a sink, with water cistern and tap, and a drying bench. An autoclave, a steam sterilizer, a hot-air oven and a water-bath are all included, as also are two shelves with brackets. Petri dishes, flasks, stains and reagents are carried in wooden boxes which, when removed from the larger cases, can be fixed on a wall as cupboards.

An illustration shows the whole equipment set up in a room, and nine other illustrations show the method of arrangement of the inner boxes and their contents.

The laboratory appears to be well equipped and put up in a very compact form.

CROOKS J., and SIGNY A. G. **Suppurative Gonorrhœal Arthritis in a Child.** *Lancet*, 1932, ccxxii, 238.

The writers describe a case of suppurative gonorrhœal arthritis occurring in a child suffering from vulvo-vaginitis, a patient in the Hospital for Sick Children, Great Ormond Street, London.

This is the only case of arthritis among 250 patients suffering from vulvo-vaginitis who have been in the hospital in the last fifteen years.

The girl was aged 4½ years, and when seen had pain and swelling of ten

days' duration n the right wrist-joint. For three weeks before this there had been some pain and swelling of the knees, the left wrist and the right ankle, but these subsided spontaneously except for a slight swelling of the left wrist; vaginal discharge had been present for a month.

Purulent fluid was aspirated from the right wrist and gonococci were found in this fluid, as also in smears made from the vaginal discharge.

The wrist-joints were immobilized and gonococcal vaccine was injected weekly in doses of from 2½ millions to 75 millions. The vulvo-vaginitis was treated with protargol packs and daily douching with chloramin T solution.

The joints became normal in a fortnight, and in three months gonococci could not be found in vaginal smears.

LOWE, J., and CHRISTIAN, E. B. **Bacteriological Examination in Leprosy.** *Indian Journ. Med. Research*, 1931, xix, 867.

In this interesting paper the authors discuss the results of bacteriological investigation in leprosy and their own findings in an examination of 160 lepers of various types in the Leprosy Hospital, Dichpali.

The presence of *Mycobacterium lepræ* in the nasal discharge was first described by Sticker in 1897, but most workers report that the organism is more frequently found in the skin than in the nose.

The authors employed in their investigation six methods of examination commonly used:—

(1) Smear of nasal mucous membrane.

(2) Scraping of nasal mucous membrane.

(3) Skin slit in suspicious lesions on skin other than of the ear.

By "skin slit" is meant a slit made by a scalpel extending into the corium, bleeding being prevented by compression by the fingers and any blood present being wiped away. A scraping is then made deep in the corium with the point of the scalpel, on which the loose material is then drawn out and smeared on a slide.

(4) Skin clip smear.

In this method a piece of skin in a suspicious area is pinched up with a fine forceps or by transfixing it with a needle; a fragment of skin, including the corium, is then snipped off with a scissors curved on the flat. The piece of skin is then rubbed on a slide, corium downwards, so that a smear of the bacillus-containing area is obtained.

(5) Ear lobe skin slit.

(6) Ear lobe skin clip.

(7) Gland puncture.

(8) Excision of skin for sectioning.

For routine examinations (7) and (8) are not advised by the writers.

Each patient was examined by methods (1) to (6), with the following results:—

(1) Nasal smears: 45 of the 160 showed *M. lepræ.*
(2) Nasal scrapings: 65 of the 160 showed *M. lepræ.*
(3) Skin slits: 94 of the 160 showed *M. lepræ.*
(4) Skin clips: 104 of the 160 showed *M. lepræ.*
(5) Ear skin slits: 110 of the 160 showed *M. lepræ.*
(6) Ear skin clips: 128 of the 160 showed *M. lepræ.*

It is seen that in methods (5) and (6), of the 320 slides made from the ear, 238, i.e., 75 per cent., gave a positive result.

In thirty-six cases where examination of other parts of the body was negative, the organism was found in the ear.

In only four cases were ear slides negative where the organism was found in other parts of the body.

The authors advise that the ear should always be examined and, in addition, a suspicious area in some other part of the body.

Six early cases are illustrated on two plates in the original article.

DUNDAS-GRANT, Sir JAMES. **Shortening an Elongated Uvula for the Cure of Cough.** *Brit. Med. Journ.*, 1932, i, 375.

The author of this article is convinced that general or special practitioners of any considerable experience must have seen cases in which an intolerable cough has been completely removed by the operation (shortening the uvula), and must have been surprised to hear it described as "a discarded method," and "utterly unsuccessful in achieving its purpose." He considers it would be most regrettable if they were to be deterred from affording such relief on account of the *ipse dixit* of any writer, authoritative or dogmatic.

In a previous communication to the *British Medical Journal*, the author referred to the value of the operation in "suitable" cases, and the present article is the result of his promise, then made, to publish an account of cases which he considered to be such. He describes those cases as suitable for intervention by the application of astringents or the removal of the redundant portion of the uvula which, on lying down, have a "tickling" cough and also have an obviously elongated or trailing uvula. In cases in which the suffering of the patient is not too clamant the author has succeeded in affording relief by the application of what he calls "jam," in the form of two drachms of syrup of Virginian plum with six drachms of glycerine of alum. If this fails to act, or the cough is extremely severe, he considers that the judicious removal of a portion of the uvula is called for.

Short accounts of eleven consecutive cases are given in which the uvulas were shortened, with good after-effects.

The author quotes the remarks of a medical colleague whose uvula was shortened many years ago, and whose "trouble was an irritating spasmodic cough on lying down on my back; more than once it resembled a mild

attack of whooping-cough. After thoroughly cocainizing, you removed fully half an inch of my uvula, and the cough has never bothered me since! You may add my name to your list, if you like, and I can honestly say that I have quite a number of times relieved and removed an irritating cough by shortening an elongated uvula."

To shorten uvulas of inordinate length which appeared to nestle down quietly without causing any symptom is not called for, and as a rule the operation is appropriate only when there is no other apparent cause for the cough, such as tuberculosis. There are exceptions, for example, in a few cases of tuberculosis of the larynx and lungs, in which the cough is increased in intensity and frequency by a trailing uvula, with its characteristic symptom of tickling on lying down. In these cases the author diminishes the suffering by discreet and almost bloodless shortening of the uvula. The uvula in a case of cancer of the inlet of the larynx, with narrowing of the air-way, in a middle-aged man, was shortened with resultant freedom from cough and attacks of syncope.

In the operation, after anæsthetization of the uvula, the tongue is depressed by the scissors held in the right hand, and the tip of the uvula is gripped with the forceps held in the left hand and pulled forwards. The uvula is then cut with the scissors, *upwards and backwards,* so as to leave the raw surface on the posterior aspect of the organ. The portion left should be of the size of a small normal uvula. As the uvula is very elusive it is necessary to have sharp points on the grasping parts of the forceps.

It is only occasionally possible to produce the ideal result, which is obtained by the removal of a small semi-œdematous elongation beyond the muscle. It has been proposed to cut out a wedge in the tip of the uvula, but under ordinary conditions one has to be content with a less elaborate technique.

The author finds it desirable to apply the galvano-cautery to the raw surface to minimize hæmorrhage. He has also amputated by means of the galvano-caustic snare, but without any special advantage; and he disagrees with those who hold that calcium is effective only if administered by the veins.

It is advisable to prescribe calcium bromide before meals and at bed-time for two or three days preceding the operation.

DUBOIS, CH., and SOLLIER, N. **Diagnosis of Undulant Fever. Simplification of the Technique of Burnet's Intradermal Reaction.** *Compt. Rend. Soc. Biol.*, 1932, cix, 359.

Melitine prepared with an ordinary peptone broth made from beef or veal, and injected intradermally by Burnet's method (Burnet, Et., *C. R. de l'Acad. des Sc.*, 1922, clxxiv, 421), sometimes produces a non-specific local reaction in individuals not suffering from undulant fever. This reaction—

a slight redness, sometimes painful, at the site of injection—is due to hetero-albumins in the broth.

In order that such a reaction may not be mistaken for a true positive reaction, it is usual to make a control injection with ordinary broth at the same time as the melitine is injected.

The writers prepared a nutrient broth from human placenta (human placenta 400 grammes, glucose 5 grammes, and water 600 grammes), in which they grew *Brucella melitensis*, growth taking place rather more slowly than in ordinary broth. After thirty days at 37° C. in the incubator the culture is filtered, the filtrate giving a melitine quite as active as that produced in ordinary broth and equally stable.

A number of individuals were injected intradermally with 0·1 cubic centimetre of each type of broth to see whether there was any difference between them. The test individuals were:—

Fifteen patients suffering from various diseases, some febrile.

Fourteen patients suffering from pulmonary tuberculosis.

Five pregnant women.

Five post-partum women.

The ordinary broth produced an erythematous reaction in some of these (the number is not stated), but no reactions occurred in the placental broth injections.

Then seven patients suffering from undulant fever received injections of both types of melitine, and typical reactions occurred in every case, the placental broth melitine reaction being exactly the same as that produced by the ordinary melitine.

The authors conclude that they have produced a melitine which gives a specific reaction, and that a control injection is unnecessary.

DUNLEY-OWEN, A. **The Indiscriminate Use of Liquid Paraffin.** *South African Med. Journ.*, 1932, vi, 87.

The author of this short clinical note refers to the popularity during the last twenty years of liquid paraffin as a laxative, and which has been widely proclaimed as a cure for constipation. He states that according to the advertisements, it is non-absorbable by the bowel and does not irritate, that it is a highly active solvent, and prevents the absorption of toxins found in the intestinal tract. His opinion is that there is grave danger when the drug is used indiscriminately by those habitually constipated unless they resort to the use of purgatives.

Thirty-four of the author's patients, all European females between 30 to 45 years of age, came to him with the same complaint, i.e., gradual loss of weight and appetite, and weakness. In every one of the cases the author was able to eliminate cancer, phthisis, diabetes, etc., as being the cause of the loss of weight. It was a curious fact that not one of the patients suffered from constipation, which elicited the fact that they

attack of whooping-cough. After thoroughly cocainizing, you removed fully half an inch of my uvula, and the cough has never bothered me since! You may add my name to your list, if you like, and I can honestly say that I have quite a number of times relieved and removed an irritating cough by shortening an elongated uvula."

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constantly took liquid paraffin. Some took it three times a day; others took one or two large tablespoonfuls every night at bed-time.

All the cases were treated by the author on the same lines, i.e., to prohibit liquid paraffin absolutely. As an alternative he gave two varieties of tablets: one containing aloin with nux vomica and belladonna, the other phenolphthalein. A rhubarb and soda mixture was given during the day. He also endeavoured to persuade the patients to use a rubber roller to massage the abdomen every morning before rising.

There was a return to health after two to three months and weight increased. In one case, a woman, aged 36, who weighed 98 pounds when first seen, there was an increase in weight of 36 pounds in two months.

The author of the paper is of opinion that in these cases the oil caused the mucous membrane of the stomach and intestines to become so coated with the paraffin as to prevent the normal flow of the gastric and intestinal secretions, so that the digested food could not be absorbed, with consequent loss of benefit to the patient.

Reviews.

(1) HUMOUR IN THE ARMY; (2) HUMOUR AMONG THE DOCTORS. By John Aye. London: The Universal Press. 1931. Pp. 158 and 157. Price 5s. each.

We congratulate the Universal Press in publishing a series of six humorous books, of which the above two are samples. The series has been named the Ideal Library. The author is Lieutenant-Colonel J. Atkinson, D.S.O., O.B.E. (John Aye), and there is a Preface by that famous author, Ian Hay.

We enjoyed reading these books immensely. The series would make a fine addition to a hospital library.

Each book is fitted with a patent dust-proof cover to protect the tops of the pages.

RECENT ADVANCES IN BACTERIOLOGY, AND THE STUDY OF THE INFECTIONS. Second Edition. By J. Henry Dible, M.B. (Glas.), F.R.C.P. London: J. and A. Churchill. 1932. Pp. xi + 476, 29 text-figs. Price 15s.

In his preface to the new edition of this work, the author says it is becoming more and more evident to him that to follow the many diverging lines of research in so rapidly growing a subject is almost beyond the capacity of one individual. Nevertheless, he has made an admirable attempt to do so.

How diverse the subject still known as bacteriology is indeed becoming

will be realized when it is seen that no fewer than seven out of the twenty-two chapters deal with the "virus" group of diseases, the cause of which is now suggesting itself to thoughtful minds as not a micro-organism but an altered state or mode of functioning of the cell-metabolism. The author himself dimly recognizes this in one or two places. Thus, in summing up his discussion on the bacteriophage, he says that this introduces a phenomenon which lays open the whole question of stability in bacterial species and logically, therefore, in other cells too, and brings our conception of the nature of virus diseases into the same field. Again, in considering the infective theory of malignant disease, the author concludes that while it requires some effort of the imagination to escape from the habit of regarding a virus infection as a bacterial disease upon a smaller scale, it is not necessary or even logical to do so. Unfortunately, however, the author does not attempt to apply and discuss this possibility in the case of the several virus diseases, but contents himself with the conventional (and, incidentally, erroneous) view that the specific "bodies" often found are parasites of some kind. The book would have gained greatly in value if certain recent work and its interpretation in this connection had been much more adequately considered than it is. However, this is an oversight which can easily, and will doubtless, be rectified in the next edition. In the meantime this excellent compendium will be a valuable supplement for those already possessing a standard work on bacteriology, perhaps not quite up to date, who desire to have by them also the gist of the latest acquirements of knowledge in the various ramifications of what constitutes really not one wood, but two quite distinct ones.

The reviewer has dealt with this aspect of the subject since it is a question of fundamental importance to-day in regard to the study of the infections. But it may be added that among the particularly topical subjects discussed in the true bacteriological sections are: the Salmonella group, B.C.G., Brucella infections, antigenic structure and the various flocculation tests for syphilis. The book is interestingly written, well supplied with references (though the omission of a few important papers is to be noted), and excellently produced. H. M. W.

THE RATIONAL TREATMENT OF VARICOSE VEINS AND VARICOCELE. By W. Turner Warwick, M.A., M.B.Cantab., F.R.C.S.Eng. London: Faber and Faber, Ltd. 1931. Pp. 188. Price 5s.

A small book of 188 pages, dealing primarily with the injection treatment of varicose veins. The ætiology of varicosis and anatomy of the venous system of the lower limbs are fully described. The operative treatment of varicose veins and its limitations are discussed. The technique and after-treatment of the injection method are fully described and the contra-indications to this form of treatment are well set out. The treatment of varicocele is described, both operative and by injection. It is not

very clear whether the author is in favour of injection or not. There is a useful appendix on the application of the obliterative treatment to swellings lined by endothelium, such as hydrocele, bursæ and ganglia. There is also a short chapter on the injection treatment of piles.

This book should serve a very useful purpose, especially as it contains information on the treatment of varicosis in the various situations and on cystic swellings lined by endothelium. J. M. W.

EMERGENCY SURGERY. Volume II. Thorax, Spine, Head, Neck, Extremities, &c. By Hamilton Bailey, F.R.C.S.Eng Bristol: John Wright and Sons, Ltd. 1931. Pp. xvii + 415. Price 25s.

This is the companion to the volume of Emergencies of the Abdomen and Pelvis.

Mr. Eric Watson-Williams has written the sections on oto-rhino-laryngology and Mr. Humphrey Neame the chapter on the eye. Some of the points in these sections seem rather specialized for the ordinary general surgeon, even if he had the necessary instruments. In the chapter on the blood-vessels it is good to see really adequate methods of approach described and the illustrations after Fiolle and Delmas. There is an excellent article on blood transfusion; also specially good chapters on infections of the hand, burns and on acute specific and pyogenic infections generally.

The illustrations are profuse and excellent and form a great feature.

This and its companion volume give an enormous amount of useful and practical information in emergency surgery, and are very well worth a place in any surgeon's library. J. M. W.

THE MANAGEMENT OF ABDOMINAL OPERATIONS. by Rodney H. Maingot, F.R.C.S.Eng. London: H. K. Lewis, Ltd. 1931. Pp. xii + 312, Price 7s. 6d.

This is a handy volume of 312 pages, with many blank pages for the insertion of notes, prescriptions, etc. It covers not only after-treatment but pre-operative treatment, anæsthetics, blood transfusion, etc. The teaching on the whole is excellent. If one may criticize, there are many methods of treatment given and not sufficient indication as to the relative value of each. The chapter on appendicitis is particularly useful, especially dealing with the pre- and post-operative treatment for a case of chronic appendicitis; also the chapter on ileus, in which the teaching of Mr. Tyrrell Gray is extensively quoted. Considerable attention is given to diet.

On the whole an extremely useful publication and one to be confidently recommended. J. M. W.

FERTILITY AND STERILITY IN MARRIAGE. THEIR VOLUNTARY PROMOTION AND LIMITATIONS. By Th. H. Van de Velde. Translated by F. W. Stella Browne. London: William Heinemann (Medical Books), Ltd. 1931. Pp. xvii + 448. Twenty plates. Price 25s. net.

The author of this book has treated his subjects with great detail.

Much of the text relating to the practice of contraception is of ethical value only, and some of the methods described can hardly be considered as likely to appeal to the majority of readers.

That portion of the book relating to fertility is of unquestionable value, both to the consultant and general practitioner, and for this reason the work is useful both as a reference book and guide.

P. C. F.

SOME RADIUM CASES AT THE MIDDLESEX HOSPITAL: a photographic record. By A. Cameron Macleod, M.B., F.R.C.S. With 122 plates. Published for Middlesex Hospital by John Murray, Albemarle Street, London, W. Pp. vii + 154. Price 7s. 6d. net.

The author has presented a selected number of mostly successful cases treated by radium. The excellent clinical photography is well worthy of careful study.

This is not a treatise on radium, radon, etc., but a short description of methods now in use profusely illustrated by excellent reproductions. These seriatim methods show the progress of the cases in a notable manner. The progress of radio-therapy is such that the author might bring out the results of new methods of treatment in this manner at selected intervals. This volume can well be read along with the statistical records of the Medical Research Council for 1930. D. B. McG.

MEDICAL RESEARCH COUNCIL (MEDICAL USES OF RADIUM). Summary of Reports from Research Centres for 1930, published by His Majesty's Stationery Office, London, 1931. Price 1s. net.

This is the Ninth Annual Report to the Medical Research Council, and is largely statistical and deals with the reports of the recognized centres of research for 1930. The various sites for treatment including both those in which the action of radium was favourable and unfavourable, etc., are tabulated, but the numbers in any particular case are small. Collected over a period of years, every link in the long chain of evidence will become of value. If any criticism be made, it is that similar treatments carried out at different centres are not always identical. It is difficult to standardize either the worker or the patient. The report deals with cases treated by all methods, surgery, radium, X-rays, in all combinations. A very valuable report, along with its eight predecessors. D. B. McG.

THE HYGIENE OF MARRIAGE. By Isobel Emslie Hutton, M.D. London: William Heinemann (Medical Books), Ltd. 1932. Pp. xii + 140. Price 5s.

The third edition of Hygiene of Marriage has brought this eminently valuable and comprehensive book up to the standard of modern knowledge and requirements in all respects. The author treats her subject with knowledge and lucidity. The book entirely fulfils its purpose, which is instruction and enlightenment in these matters for the general public. The chapter on contraception is both comprehensive and up to date in the light of modern gynæcological knowledge.

It is a book that can be recommended to all who seek enlightenment on these matters. It should prove of great value to newly-married persons.

P. C. F.

AN INDEX OF PROGNOSIS AND END-RESULTS OF TREATMENT. By various writers. Edited by A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S. Bristol: John Wright and Sons, Ltd. 1932. Pp. xi + 599. Price £2 2s. net.

All who are familiar with the well-known *Index of Prognosis* will welcome the appearance of its fourth edition, for, during the nine years which have elapsed since the last edition was published, many changes have taken place in medical and surgical practice.

The editor, Mr. Rendle Short, draws attention in the preface to the new edition to the greatly improved outlook in the grave anæmias, diabetes, bilharzia infections, many forms of cancer, and in many other diseases, and he states that the changes have been so great that about half of the present edition is new material.

In addition to the editor there are twenty-eight contributors to this book, and among them are surgeons, physicians, gynæcologists, and specialists in anæsthetics, dermatology, infectious diseases, ophthalmology, otology, tropical medicine, etc.

An Index of Prognosis is a companion volume to An Index of Differential Diagnosis and An Index of Treatment from the same publishing house, and with these three volumes a practitioner has a complete medical library.

It is impossible to review in detail such a volume as this, but for those not acquainted with the previous editions one may say that it does not consist of wearisome tables of statistics of results in the various diseases. Although there are many statistical tables collected from the work of hospitals and of writers in many countries, of great value in estimating the end-results of various forms of treatment, methods of treatment and types of disease are considered in great detail.

For example, appendicitis occupies fifteen pages, and in addition to statistics in general of results of early operation and of cases with various complications, there are sections on the bacteriological conditions, on

appendicitis during pregnancy, on chronic and on recurring appendicitis, on the influence of sex and age, and on gall-stones and colitis in appendicitis. About sixty references to literature complete the subject.

Anæsthesia is dealt with from various points of view: the anæsthetic, mode of employment, experience of the anæsthetist, the condition of the patient, the operation which is being performed, post-operative effects. The various anæsthetics and analgesics are fully dealt with, the conditions for which they should be employed are discussed, as well as their action and the occurrence of untoward effects, their causes and avoidance.

The book has an extensive index.

The work can be recommended as a most useful aid in all forms of medical practice.

L'Œuvre du Service de Santé Militaire en Algérie, 1830-1930. Paris: Charles-Lavauzelle et Cie. 1931. Pp. 363.

This is an official publication from the Medical Department of the French War Office. It is issued as part of the celebrations held to commemorate the Hundred Years' work of the French Army in Algeria. Essentially, the book is a history of Military Medical Science in North Africa, and this is considered under the heading of diseases, and also in the accounts of the work of the more prominent officers. Naturally, first place is given to the investigations of Laveran, but the work of Malliot and Vincent also receives adequate attention. The accounts of the infectious diseases in Algeria are given in full, and it may be of interest to note that prophylactic inoculation against typhoid fever was commenced in North Africa as early as 1912, and appears to have been general in 1913. The immediate changes in morbidity and mortality rates are as striking as any of our own figures.

Notices.

ELITYRAN.

MESSRS. BAYER PRODUCTS, LIMITED, have submitted a sample of elityran, a new thyroid preparation which is stated to have definite advantages over thyroidea sicca of the British Pharmacopœia. The advantages claimed for elityran are (1) ready solubility; (2) exact standardization, enabling dosage to be gauged with precision; and (3) absence of the usual by-effects of thyroid medication, such as cardiac palpitation and nervous upset. The manufacturers state that extensive trial has shown that many cases which do not tolerate ordinary thyroid preparations may be given elityran without any unpleasant sequelæ. Elityran is issued in tablets of 25 mg. each, in tubes of thirty.

FLOODLIGHTS ON PHOTOGRAPHY.

"FLOODLIGHTS ON PHOTOGRAPHY" is the title of an interesting booklet issued by Burroughs Wellcome and Co.

The subject matter deals with methods for obtaining correct exposure by means of the "Wellcome" Exposure Calculator, factors that influence development, and the improvement of prints by toning and staining. The fact that development is a precise operation is given due emphasis. The use of "Tabloid" Desensitiser and the universal developer, "Tabloid" "Rytol," greatly simplifies the process. Information is given on reduction and intensification of negatives.

In the section dealing with toning and staining of prints, methods are described for the production of realistic colour effects by means of "Tabloid" toners and "Soloid" stains.

OFFICE INTERNATIONAL DE DOCUMENTATION DE MÉDECINE MILITAIRE.

THE second session of conferences of the Office International de Documentation de Médecine Militaire will be held at Liége, Belgium, from June 22 to 25, 1932. This office is one of the activities of the International Congress of Military Medicine and Pharmacy.

Papers will be read daily. On June 23, at 9 p.m., there will be an inaugural fête; on June 24, at 9 p.m., there will be a soirée given by the town of Liége; on June 25, at 4 p.m., the Queen of Belgium will honour the opening session of the *Journées Médicales* at Brussels.

Amongst the subjects discussed will be: Aeronautic Medicine; The Responsibility of the Military Medical Officer; the Principles of Hospitalization on Active Service; the Medical Service in a Militia Army; Clinical Laboratories in the Field; Bacteriological Laboratories.

Membership is free. All medical officers are eligible. Application for membership should be made, as early as possible, to Lieut.-Colonel Médecin Voncken, Hôpital Militaire, Liége, Belgium.

Information as to reduced fares may be had from Thomas Cook and Son.

SILANTOX (SILICA GEL, LTD., BUSH HOUSE, LONDON, W.C. 2).

COLLOIDAL silicon dioxide—a toxin adsorbent for internal and external use, has been used internally with success in chronic intestinal toxæmia, diarrhœa and rheumatism. As an external application it has been well reported on, both as a preventive and remedy for sore feet or excessive local perspiration. The pain following superficial burns is relieved, and the irritation in dermatitis much reduced.

THE QUARTERLY BULLETIN OF THE HEALTH ORGANIZATION OF THE LEAGUE OF NATIONS.

An announcement of considerable interest to the Medical World is made by Allen and Unwin, the official agents for the publications of the League of Nations.

In response to a world-wide demand that the publications of the League's Health Organization should be made more accessible and therefore more widely known, the League has just decided to publish this authoritative material in a new periodical entitled *The Quarterly Bulletin of the Health Organization*, the first number of which is to be issued shortly.

Although only ten years old, the Health Organization has already extended its activities to all parts of the world, and its technical advice is often sought by the Governments.

THE BRITISH EMPIRE CANCER CAMPAIGN.

We have received the following announcement from the Grand Council:—

> "The Grand Council of the British Empire Cancer Campaign begs to announce that, in accordance with the Rules and Regulations, the 1931 Garton Prize and Medal will not be awarded as, in the opinion of the Judges appointed by it, none of the Essays that dealt with the set subject—'The Early Diagnosis of Cancer'—was of sufficient merit."

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a nom-de-plume.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

A free issue of twenty-five reprints will be made to contributors of Original Communications and of twenty-five excerpts in the case of Lectures, Travels, Clinical and other Notes, and Echoes of the Past.

Reprints or excerpts, additional to the above, can be furnished on payment if specially ordered at the time of submission of the article for publication.

Communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, War Office, Whitehall, London, S.W. 1."

MANAGER'S NOTICES.

The Annual Subscription for the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is £1 payable in advance. Single copies, 2s. per copy.

Cheques, etc., should be made payable to the "Journal R.A.M.C.," and crossed "Holt & Co."

Each subscriber who pays his subscription direct to the Manager will also receive monthly a copy of "The R.A.M.C., The A.D. Corps, and Q.A.I.M.N.S. *News and Gazette.*"

Communications in regard to subscriptions, change of address, etc., should be addressed "THE MANAGER, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.2, WAR OFFICE, WHITEHALL, LONDON, S.W. 1."

ADVERTISEMENTS.

Communications regarding Advertisements should be addressed—

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of the

Royal Army Medical Corps.

Original Communications.

AN EASTERN COMMAND ROYAL ARMY MEDICAL CORPS STAFF EXERCISE.

By MAJOR-GENERAL H. ENSOR, C.B., C.M.G., C.B.E., D.S.O., K.H.S.

THIS Exercise was held at Crowborough on December 2, 3 and 4, 1931, as part of the Winter Training of R.A.M.C. Officers in the Eastern Command.

The Exercise is founded on War Office Exercise No. 3 (1930) so far as most of the dispositions of the fighting troops are concerned.

The objects of the Exercise were the following:—

(1) To consider the minimum medical arrangements necessary at a temporary oversea base for a corps of two divisions and a cavalry brigade.

(2) To study the medical arrangements required during the retirement of a division in touch with the enemy.

(3) To become familiar with the modified British system of map references, Chapter VII, Section 45, Manual of Map Reading, Photo Reading and Field Sketching, 1929.

Narrative No. 1, the Order of Battle of the Atlantis Corps and 1st Cavalry Brigade and Problem 1 were issued to the officers forming the Syndicates some days before December 1.

NARRATIVE No. 1.

Reference Map No. 1.

Atlantis, an Empire powerful by land and sea, distant a few hours steaming from England, is at war with another European Power and has reason to believe that England will shortly intervene in the struggle and send an Expeditionary Force to the aid of her enemy.

In order to interfere with the mobilization of England's Expeditionary Force, Atlantis, without any formal declaration of war, on November 21 landed a corps of two divisions and a cavalry brigade at Newhaven with the idea of making a raid on London, and by this means disorganizing the government of the country.

Atlantis has had her fleet fully mobilized for some months and is temporarily in command of the sea. It is anticipated by her that this command is not likely to be challenged successfully by the English fleet until at least a month has elapsed.

The landing was effected with practically no opposition, and by dawn on November 22 a line, Alfriston 9K—Lewes 8K—Newmarket Hill 8K, was occupied by an infantry brigade to cover the disembarkation.

On November 28 the Atlantis Force, consisting of the 1st Division, 2nd Division (less one infantry brigade) and the 1st Cavalry Brigade, advanced on London.

1st Division advanced on road Seaford 9L—Ringmer 8K—Uckfield 9J—Edenbridge 8G.

2nd Division on road Lewes 8K—East Grinstead 8H—Godstone 8G.

The 1st Cavalry Brigade covered the flanks, one regiment on right flank, headquarters and remainder of the cavalry brigade on left flank. No opposition was met with until the Atlantis Force reached the general line of the Eden River on evening of November 30.

On December 1 the English troops were driven north of the road Sevenoaks 9F—Godstone 8G, and early on December 2 the Atlantis troops attacked the high ground north of the road.

The 1st Division attacked at dawn on a two brigade front from the line Westerham 8G—Limpsfield 8G—Oxted 8G (excl.). 3rd Infantry Brigade in reserve in Crockham Hill Common area 8G.

The 2nd Division (less 6th Infantry Brigade) attacked at dawn from the line Oxted—Godstone (incl.), with 4th Infantry Brigade in reserve about one mile south of Tandridge 8G.

The English troops had, however, been reinforced and the attack made little progress, and by the evening of the same day the Atlantis troops were approximately on the following line :—

1st Division. Westerham 8G—Limpsfield 8G—Oxted 8G (excl.).

2nd Division. Oxted (incl.)—Godstone (incl.).

1st Cavalry Brigade. In touch with enemy cavalry north of Godstone—Reigate road 7G.

Atlantis Corps Headquarters is at East Grinstead 8H.

On the same day the Atlantis Corps Commander received information that the Atlantis fleet had been engaged by a smaller English fleet and, although successful in driving it off with some loss, had lost so heavily in ships and personnel as to make its present command of the sea somewhat precarious. In consequence, the Atlantis G.H.Q. had ordered the withdrawal of the Atlantis Corps and its re-embarkation for a home port.

The 6th Infantry Brigade, detached from the 2nd Division, had, under orders of Corps Headquarters, been employed since November 22 in forming a defensive line, Alfriston—Lewes—Newmarket Hill.

During the attack on the high ground north of the Westerham—Godstone road, the 1st Division had employed three battalions of the 1st Infantry Brigade and three battalions of the 2nd Infantry Brigade. The 3rd Infantry Brigade had been kept in reserve. The 2nd Division had employed three battalions of the 4th Infantry Brigade, but had not used its 5th Infantry Brigade.

It is estimated that the casualties amount to twenty per cent of the battalions engaged.

Railheads have been established as follows:—

Ammunition. Lewes 8K.

Supplies, 1st Division and Corps troops. Seaford 9L.

2nd Division and 1st Cavalry Brigade. Newhaven 8L.

Medical. Uckfield 9J.

Notes to Narrative No. 1.

(1) The Atlantis forces are organized and equipped similarly to the British Army.

(2) The railways in the area of operations are to be considered as out of action, owing to the English troops having run off the rolling stock. The term "railhead" has been retained, but the places shown as railheads would be only depôts for supplies and ammunition.

Order of Battle of Atlantis Corps and 1st Cavalry Brigade.

1st Cavalry Brigade.

- Headquarters, 1st Cavalry Brigade.
- 1st Cavalry Regiment.
- 2nd Cavalry Regiment.
- "A" Battery Horse Artillery.
- 1st Field Troop Engineers.
- 1st Cavalry Brigade Signal Section.
- 1st Cavalry Field Ambulance.
- 1st Cavalry Mobile Veterinary Section.
- Brigade Sections, Cavalry Divisional Supply, Baggage and Ammunition Companies.
- Section Provost Squadron.

Atlantis Corps Troops (*less Medical Units*).

Atlantis Corps Headquarters.

- Corps Artillery.
- 19th and 20th Army Field Artillery Brigades.
- Headquarters, 1st Corps Medium Artillery.
- 1st Medium Artillery Brigade.
- 1st Anti-Aircraft Artillery Brigade.

Engineers.
  1st and 2nd Army Troops Company.
  1st Corps Field Survey Company.
Air Force.
  No. 1 (A.C.) Wing Headquarters.
  Nos. 1 and 2 Army Co-operation Squadrons.
Signals.
  Atlantis Corps Signals.
  19th and 20th Army Field Artillery Brigades, Signal Sections.
  1st Medium Artillery Brigade, Signal Section.
  1st Anti-Aircraft Artillery Brigade, Signal Section.
  1st (A.C.) Wing Headquarters, Signal Section.
  1st and 2nd (A.C.) Squadron, Signal Sections.
Supply and Transport.
  Headquarters, 1st Corps Troops, Army Service Corps.
  1st Corps Troops Baggage Company.
  1st Corps Troops Supply Company.
  1st Corps Troops Ammunition Company.
  1st Reserve M.T. Company.
  1st and 2nd Railhead Supply Detachments.
  Supply details of Supply Sections of 1st and 2nd Maintenance Companies.
Ordnance.
  1st Headquarters Corps Troops Ordnance Workshop.
  1st Corps Ordnance Field Park.
Pay.
  2nd and 3rd Field Cash Offices.
Provost.
  3rd Provost Company.
Postal.
  1st Corps Post Office.
  1st and 2nd Convoy Post Offices.

1st Division.

1st Divisional Headquarters.
  4th Cavalry Regiment.
  1st Infantry Brigade.
    1st Battalion.
    2nd ,,
    3rd ,,
    4th ,,
  2nd Infantry Brigade
    5th Battalion.
    6th ,,
    7th ,,
    8th ,,

3rd Infantry Brigade.
9th Battalion.
10th „
11th „
12th „

Divisional Troops.
Headquarters, 1st Divisional Artillery.
1st, 2nd and 3rd Field Artillery Brigades.
1st Light Artillery Brigade.
Headquarters 1st Divisional Engineers.
1st Field Park Company.
1st, 2nd and 3rd Field Companies.
1st Divisional Signals.
Headquarters, 1st Divisional Army Service Corps.
1st Divisional Supply Company.
1st Divisional Baggage Company.
1st Divisional Ammunition Company.
1st, 2nd and 3rd Field Ambulances, Army Medical Corps.
1st Divisional Ordnance Workshop.
1st Mobile Veterinary Section.
1st Provost Company.

2nd Division.

As for 1st Division as far as the number of units is concerned.

PROBLEM 1.

(*a*) State very briefly what recommendations you would make as D.G.M.S. at Atlantis General Headquarters for the medical arrangements at the port of Newhaven which, for the purposes of this exercise, is to be considered as a first-class port, with all facilities for the loading and unloading of ships.

(*b*) What Corps medical units do you consider to be necessary for the needs of the Atlantis Corps. Medical units which are normally Army units are to be considered as Corps medical units for the purpose of this Exercise.

On December 1, the Directing Staff and the officers comprising the Syndicates, sixteen in number, four to each Syndicate, assembled in the afternoon and on arrival handed in their solutions of Problem 1.

At 2030 hours a conference was held and the Director stated how he considered Problem 1 should be solved.

He said that it is obvious that the operation intended in England is a raid only, and that the troops employed will be in England only a month or less.

In consequence the medical arrangements at the port of Newhaven, the base of the Atlantis Corps, must be the minimum.

The recommendations to be made by the Director-General of Medical Services at Atlantis General Headquarters should be as follows:—

No general hospitals should be embarked and opened at Newhaven.

A general hospital cannot be embarked, carried by sea, unloaded at the port of disembarkation and be ready to open under two to three weeks. If any were sent, they would most probably be ready to open and to receive wounded by the time they would be required to pack up and to re-embark for Atlantis. Nevertheless, some medical unit to receive casualties arriving from the front is a necessity, especially for the accommodation of serious cases which cannot without danger be embarked immediately on hospital ships for transport to Atlantis, and also for the detention of slight cases which are likely to be fit for duty in three or four days.

The provision of a casualty clearing station equipped for the temporary accommodation of five hundred casualties is recommended, and the personnel of this clearing station should be increased by one matron, two sisters, eight staff nurses, and one "surgical team." This casualty clearing station would act as a reception hospital for serious cases unfit to travel at once by sea, and as an operating centre. In addition, it would also function as a reception station for slight cases.

The distance of Newhaven from Atlantis is only a few hours' steaming, and it is recommended that all cases able to travel without undue danger should be embarked at once on arrival at Newhaven.

It is considered that two hospital ships and two ambulance carriers will be required to carry out the evacuation of sick and wounded from Newhaven, and that this number of ships should make it possible to arrange that one of them will always be in readiness at Newhaven to embark casualties.

One medical officer and one N.C.O. will be required for embarkation duties at Newhaven.

The provision of a field hygiene section is not recommended. The base will not be occupied long enough to make it necessary. Reference to the Order of Battle will show that the divisional field hygiene sections have also been dispensed with. Also no base or advanced depot of medical stores will be required.

The hospital ships and ambulance carriers should all carry spare medical stores which can be issued to the divisions in the field by means of the divisional supply companies.

The number of Corps troops, even after those units not considered absolutely necessary have been deleted, is considerable. On this account the provision of a Corps field ambulance is considered a necessity.

Two casualty clearing stations, one for each division, will be required, and also a motor ambulance convoy.

The provision of mobile hygiene or bacteriological sections is not considered necessary.

We will assume that the above recommendations have been accepted by

the Atlantis General Headquarters with the exception of the demand for a motor ambulance convoy. The D.G.M.S. is to be considered as having been informed that, owing to commitments elsewhere, a complete convoy is not available, and all that can be provided is a headquarters and two sections.

The D.G.M.S. on receiving this information should request that instructions be issued that the medical services may make use of the motor lorries of the divisional supply and ammunition companies for the transport of slight cases of wounds and sickness to the base. It is to be understood that these lorries would only be used in an emergency, or when a general action is in progress.

The Corps medical units considered to be necessary are then the following:—

Field Ambulance, 1.

Casualty Clearing Stations, 3 (one for use as a Reception Hospital at Newhaven).

Motor Ambulance Convoy, 1.

It is certain that the Atlantis Corps will not be able to make use of the railways in England, and in consequence ambulance trains will not be required.

After some further discussion of much interest the conference came to an end, and Narative No. 2 and Problems No. 2 and 3 were issued to the Syndicates.

Narrative No. 3.

Reference Maps Nos. 1 and 2.

(1) The Atlantis Corps Commander at 1600 hours, December 2, issued orders for the 1st and 2nd Divisions and 1st Cavalry Brigade to retire behind the prepared defensive line Alfriston—Lewes—Newmarket Hill.

(2) The first stage of the retirement is for the two divisions and the cavalry brigade to withdraw to the area Groombridge 9H—Hadlow Down 9J—Cuckfield 7J—West Hoathly 8H, where they will be covered by rearguards which will hold the line of the river Eden until 2200 hours, December 3.

(3) The 1st Division will retire to the area Groombridge—Crowborough 9H—Fairwarp 9J—Hartfield 9H.

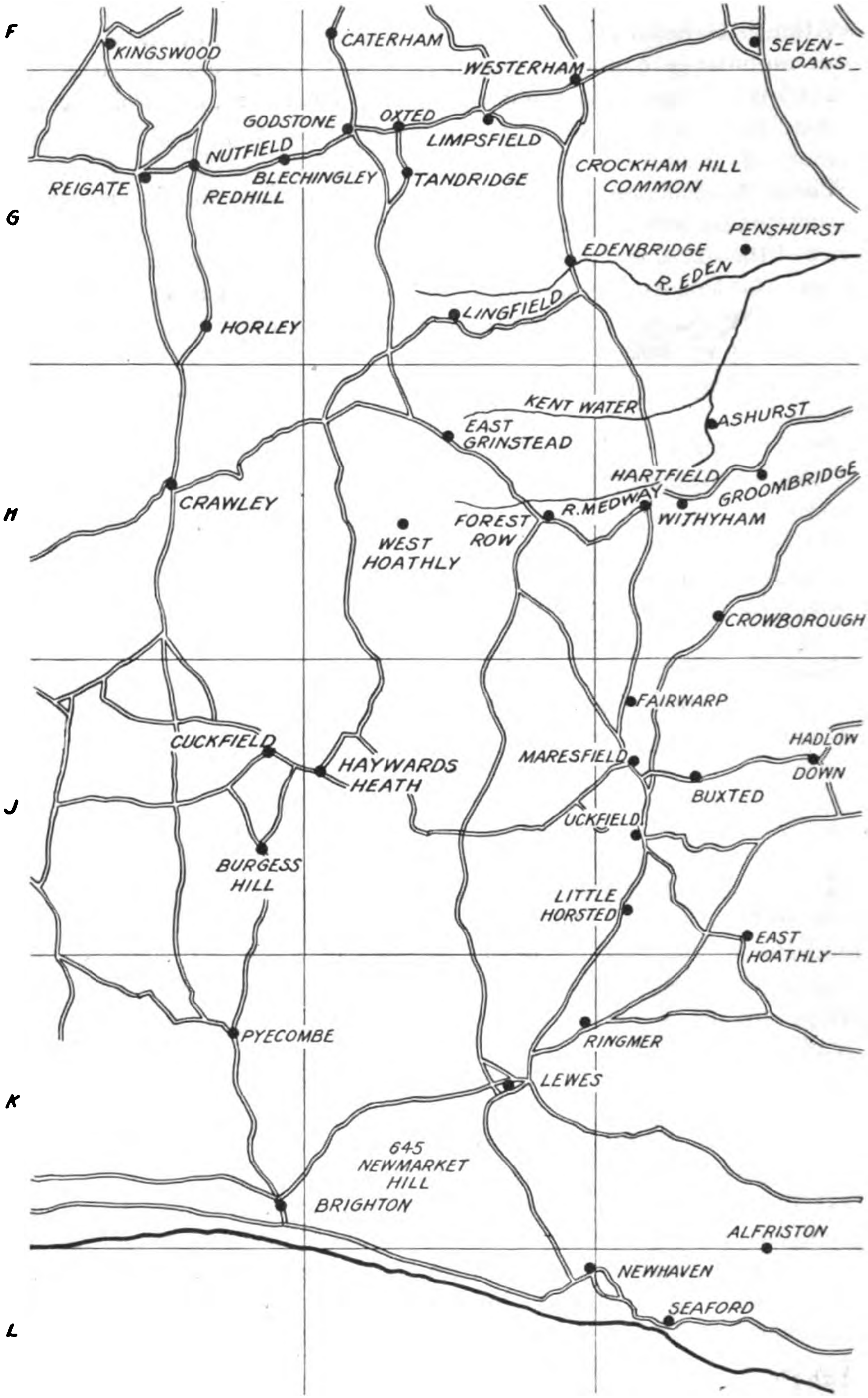
(4) Boundary between 1st and 2nd Divisions. As shown on Map 2 thence (incl. to 1st Division) road Edenbridge Q8864—Hartfield Q9154.

(5) The withdrawal will not begin before 1800 hours, December 2.

The 1st and 2nd Infantry Brigade are to deny their present positions to the enemy until 2359 hours, December 2.

(6) (*a*) The rear parties of these infantry brigades will cross the road Westerham 8G—Limpsfield 8G—Oxted 8G at 0100 hours, December 3.

(*b*) After the withdrawal of these rear parties the 4th Cavalry Regiment


F
G
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KINGSWOOD
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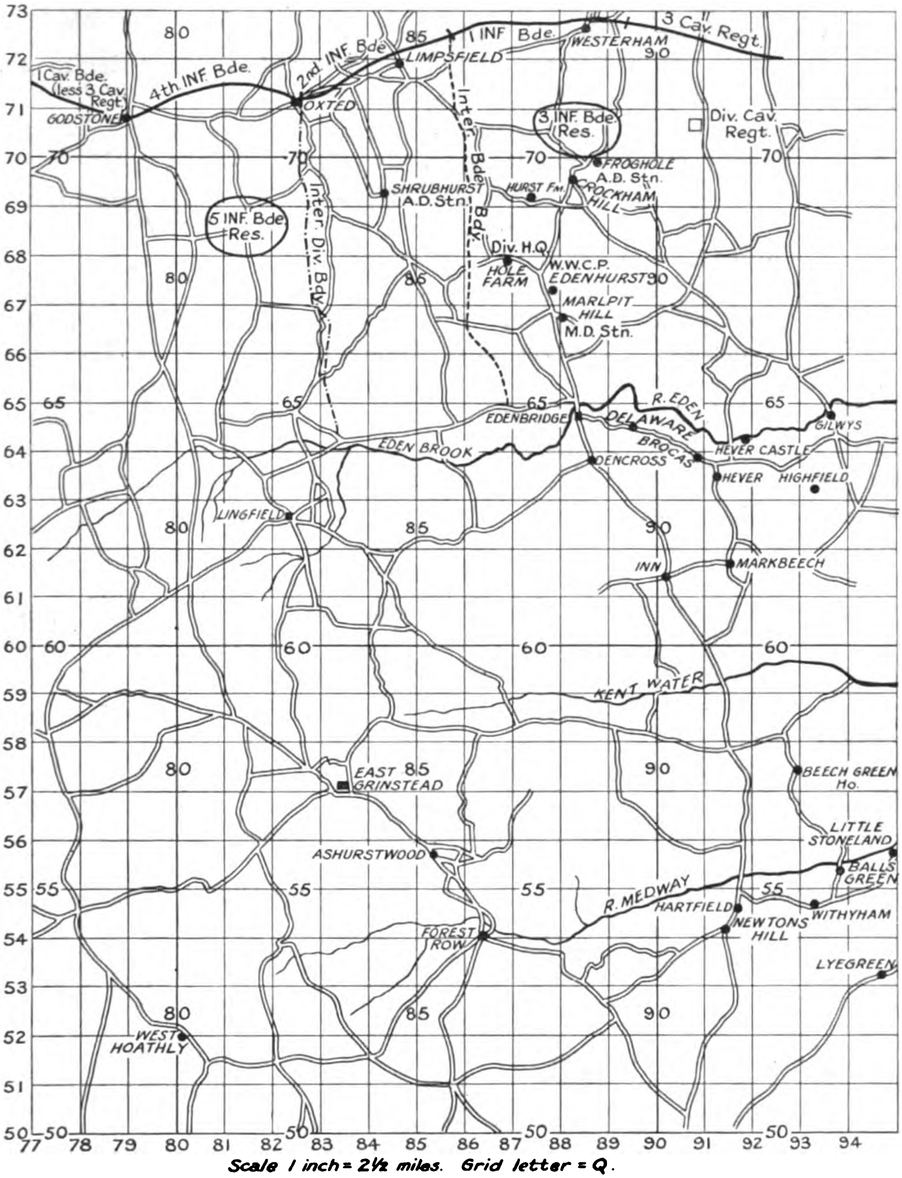
WESTERHAM
SEVEN-OAKS
GODSTONE
OXTED
LIMPSFIELD
NUTFIELD
BLECHINGLEY
TANDRIDGE
CROCKHAM HILL COMMON
REIGATE
REDHILL
PENSHURST
EDENBRIDGE
R. EDEN
LINGFIELD
HORLEY
KENT WATER
ASHURST
EAST GRINSTEAD
HARTFIELD
GROOMBRIDGE
CRAWLEY
R. MEDWAY
WITHYHAM
FOREST ROW
WEST HOATHLY
CROWBOROUGH
FAIRWARP
HADLOW DOWN
CUCKFIELD
MARESFIELD
HAYWARDS HEATH
BUXTED
UCKFIELD
BURGESS HILL
LITTLE HORSTED
EAST HOATHLY
PYECOMBE
RINGMER
LEWES
645 NEWMARKET HILL
BRIGHTON
ALFRISTON
NEWHAVEN
SEAFORD
Scale = 1 inch = 5 miles

Map 1.

(less one squadron and one troop m.g. squadron) will gain touch with the advancing enemy on the above line and delay his advance, so that he does not come up to the River Eden before 0400 hours, December 3. On passing



Map 2.

through the defensive line on the River Eden the 4th Cavalry Regiment will assemble at Ashurst 9H and come into divisional reserve.

(7) (*a*) The Commander 3rd Infantry Brigade will act as rearguard

Commander to the 1st Division and will be prepared by 0400 hours, December 3, to hold the line of the River Eden within divisional boundary against the enemy until 2200 hours, December 3.

(*b*) The rearguard will be composed as follows :—

Commander—3rd Infantry Brigade Commander.

One squadron and troop m.g. squadron 4th Cavalry Regiment.
Headquarters, 1st Division Artillery.
1st Field Artillery Brigade.
2nd Field Artillery Brigade.
19th Army Field Artillery Brigade.
One Medium Battery.
3rd Light Battery.
3rd Field Company, Engineers.
3rd Infantry Brigade.

(8) Headquarters 1st Division, at Hole Farm Q8667, will close at 2359 hours, December 2, and open at Hartfield the same hour.

(9) D.D.M.S. Atlantis Corps has sent a message at 1800 hours, December 2, to A.D.M.S. 1st Division that a site in Hartfield has been reserved as a Main Dressing Station for the 3rd Infantry Brigade and attached troops on December 3.

Problem 2.

After reconnaissance of the River Eden position to be held by the 3rd Infantry and attached troops, state where you would site an Advanced Dressing Station for the service of the 3rd Infantry Brigade.

The line will be held by 3rd Infantry Brigade as follows :—

9*th Battalion.*

Gilwys Q9364—Highfield Q9363 area.

10*th Battalion.*

Hever Castle Q9164—Hever Q9163—Brocas Q9063 area.

11*th Battalion.*

Delaware Q8964—Dencross Q8863—Edenbridge Q8864 area.

12*th Battalion.*

In reserve in Markbeech Q9161 area.

Problem 3.

As A.D.M.S. 1st Division, you are informed by the Divisional Staff of the orders received from Corps Headquarters before the march tables for the retirement of the Division have been made out.

(1) State what recommendations you would make to the Staff for the withdrawal of the Field Ambulances of the 1st Division.

(2) Write the Medical Operation Order for the withdrawal of the medical units of the 1st Division on December 2 and their disposition on December 3. It may be assumed that your recommendations have been accepted.

Location of medical units of the 1st Division at 1800 hours, December 2, is as follows:—

Reference Map No. 2.

No. 1 *Field Ambulance.*

Headquarters at Main Dressing Station of Division at Marlpit Hill Q8866. Nos. 1 and 2 Companies at Advanced Dressing Station at Froghole Q8869.

No. 2 *Field Ambulance.*

Headquarters at Walking Wounded Collecting Post of Division at Edenhurst Q8767. Nos. 1 and 2 Companies at Advanced Dressing Station at Shrubhurst Q8469.

No. 3 *Field Ambulance.*

In reserve with 3rd Infantry Brigade in Crockham Hill Common area Q8870.

Headquarters (Divisional), Motor Ambulance Convoy, ¼ mile N. of Edenhurst.

Early on December 3 the Commander-in-Chief, Eastern Command, General Sir Webb Gillman, K.C.B., K.C.M.G., D.S.O., and the Major-General i/c Administration, Major-General G. W. Howard, C.B., C.M.G., D.S.O., arrived at Crowborough and inspected the sites chosen for the medical units of the 1st Division for the battle on December 2. These sites are given in Problem No. 3.

Unfortunately the weather on December 3 was as bad as only an English December day can be. It rained heavily and incessantly and visibility was practically nil. This very much interfered with the reconnaissance of the River Eden position and made it impossible for the "G" member of the Directing Staff, Bt. Lt.-Col. A. P. Garnier, M.B.E., M.C., to explain how the battalions of the 3rd Infantry Brigade would be disposed to deny the passage of the Eden to the enemy. This explanation had to be given in the conference room at the hotel in Crowborough later in the afternoon. At 2030 hours on December 3, the Syndicates having handed in their solutions of Problems 2 and 3, a conference was held after the 1st Division Medical Order and orders preceding its issue had been given out to the Syndicates. These orders are given below:—

Orders to No. 3 *Field Ambulance.*

Proceed forthwith to Hartfield preceded by your motor transport, less 4 ambulance cars with divisional Motor Ambulance Convoy, and 4 horsed Ambulance Wagons attached No. 1 Fld. Amb., via road Marlpit Hill—Edenbridge—Dencross, cross road at Inn Q902614—cross roads at Q915578—Hartfield.

On arrival at cross road at Inn Q902614 detach one company of your unit to proceed to Markbeech Q9161 to form an A.D. Stn. for service of 2nd

Inf. Bde. on December 3. This A.D. Stn. to be open by 0100 hours December 3.

A M.D. Stn. for the Division to be formed by your Hd. Qrs. at Hartfield by 2100 hours to-day.

To enable you to do this two ambulance cars of your unit will be sent to you by O. i/c Divisional Motor Ambulance Convoy. These cars are to proceed with 2 officers and 16 other ranks to Hartfield, moving in convoy with the motor lorries of your Hd. Qrs.

Acknowledge.

(Signed) ....

Colonel.

A.D.M.S. 1st Division.

Issued by motor cyclist attached to A.D.M.S. office at 1800 hours December 2.

. . . .

Order issued to O. i/c Divisional Motor Ambulance Convoy.

Despatch forthwith 2 cars of No. 3 Field Ambce. to report to their Hd. Qrs. These cars will not return to you for duty.

Acknowledge.

(Signed) ....

Colonel.

A.D.M.S. 1st Division.

Issued by motor cyclist attached to A.D.M.S. office at 1800 hours, December 2.

. . . .

SECRET

1*st Division Medical Order No.* 1.

Reference maps Nos. 1 and 2.

Information.

(1) The 1st Division has received orders to retire to the area Groombridge 9H—Crowborough 9H—Fairwarp 9J—Hartfield 9H.

(2) The 2nd Division is to withdraw on the left of the 1st Division. The interdivisional boundary is (all inclusive to 1st Division) road Edenbridge Q8864—Dencross Q8863—Hartfield Q9154.

(3) The 3rd Inf. Bde. with attached troops is to act as rearguard to the division on December 3 and it is to hold the line of the River Eden from Edenbridge (incl.) to the East.

(4) The 3rd Field Ambulance, less 4 ambulance cars and 4 horsed ambulance wagons attached No. 1 Fld. Amb., has already received orders to retire and open an Advanced Dressing Station at Markbeech Q9161 by 0100 hours, December 3, for the service of the 3rd Inf. Bde., and a Main Dressing Station for the division at Hartfield. This M.D.S. is to be open for the reception of casualties by 2100 hours to-day.

Intention.

(5) No. 1 Field Ambulance less motor transport will pass under the command of the 1st Inf. Bde., so far as orders for march are concerned, forthwith.

No. 2 Field Ambulance less motor transport will pass under the command of the 2nd Inf. Bde. for march orders forthwith.

Method.

(6) Os.C. Nos. 1 and 2 Field Ambulances will be responsible that they obtain the starting points and the hours by which their units are to pass them from the Inf. Bde. Hd. Qrs. concerned.

(7) (*a*) The Main Dressing Station at Marlpit Hill and the W.W.C. Post at Edenhurst will close at 2300 hours; the A.D. Stns. at Froghole and Shrubhurst will close at the same time.

(*b*) O.C. No. 2 Field Ambulance will at 2300 hours detail a small party under an officer, with necessary equipment and the four-horsed ambulance wagons of his unit, to occupy the site of the M.D. Stn. at Marlpit Hill until the arrival of the rear parties of the 1st and 2nd Inf. Bdes. On their arrival this detachment of No. 2 Field Ambulance will come under the orders of O.C. rear parties.

(8) The Divisional Motor Ambulance Convoy will break up at 2230 hours and the cars will return to the Hd. Qrs. of their units, less one of No. 2 Field Ambulance which will at this hour proceed to report for duty to Hd. Qrs. 4th Cav. Regt. at Hurst Farm Q873692.

(9) The motor transport of No. 1 Field Ambulance will at 2315 hours retire to Groombridge via road Edenbridge—Dencross—cross road at Inn Q902614—cross roads at Q915578; thence East to road junction at Q926581; thence South via Beechgreen No. Q928574—Ballsgreen Q937553 to road junction at Q936546; thence East via Little Stoneland Q948556 to Groombridge.

(10) The motor transport No. 2 Field Ambulance will at 2315 hours retire to Newtons Hill Q91542 via road Edenbridge—Dencross—cross road Inn Q902614—cross roads at Q915578—Hartfield—Newtons Hill.

Intercommunication.

(11) Hd. Qrs. 1st Division closes at Hole Farm Q869679 at 2359 hours, opens the same hour at Hartfield.

Reports to A.D.M.S. at these places.

(12) Acknowledge.

(Signed) ....
Colonel.
A.D.M.S. 1st Division.

Issued by motor cyclist attached to A.D.M.S. Office at 1900 hours, December 2.

Copy No. 1. No. 1 Field Amb.
,, 2. No. 2 ,,
,, 3. No. 3 ,,

Copy No. 4. "G"
,, 5. "Q"
,, 6. D.D.M.S. Atlantis Corps.
,, 7 }
,, 8 } File.
,, 9 }

. . . .

The Director gave his views as to how the problems should be solved, but was careful to state that the views he was going to give were, in his opinion, those by means of which the problems could be solved, but he did not claim infallibility. Other solutions quite as good or better might be arrived at. He said that in his opinion the solution of Problem 2 was to site the Advanced Dressing Station for the 3rd Inf. Bde. at Markbeech, where good buildings were available and good roads leading to the areas occupied by the three battalions of the 3rd Inf. Bde. The third problem was a most difficult one to solve, but if he were in the position of the A.D.M.S., 1st Division, he would make the following recommendations to the Divisional Staff for the withdrawal of the field ambulances. The Atlantis Corps Commander at East Grinstead issued orders for the retirement of the troops at 1600 hours, December 2, and it is only reasonable to assume that by 1730 hours the A.D.M.S. 1st Division will have been informed by the Divisional Staff of the retirement and details, as given in Narrative 2.

Quick thinking and prompt action are necessary on the part of the A.D.M.S. The first thing he should consider is the means by which he can get another main dressing station open to take in casualties incidental to the retirement. The retirement may be a peaceful one, but it is more probable that the roads in rear of the forward areas will be subjected all night to harassing fire and, if the night be clear, to bombing attacks.

Casualties occurring in rear of the Divisional M.D. Station at Marlpit Hill must not be sent to this main dressing station, which must be cleared of wounded as soon as possible and kept clear so as to enable it to close down when ordered to do so.

The A.D.M.S. has at his disposal No. 3 Field Ambulance (less ambulance transport) which he has kept in reserve all through the day and resisted all temptations to employ it in aid of the other two field ambulances.

The D.D.M.S. Corps has realized that the A.D.M.S. will not have time to make a reconnaissance with a view to selecting a site for another main dressing station, so he has done this and selected, let us say, the schools at Hartfield, and has obtained authority from the Corps Headquarters to make use of them for this purpose. The A.D.M.S. 1st Division will, also, have been informed by the Divisional Headquarters that the 3rd Infantry Brigade are to hold the line of the River Eden, and it is obvious that this Brigade will require an advanced dressing station through which casualties will pass on their way to the main dressing station to be opened at Hartfield. He

will probably be obliged to select a site for this advanced dressing station from the map without reconnaissance, and he should get the concurrence of the staff to the formation of one in Markbeech.

The 3rd Field Ambulance is at his disposal, and he should obtain the approval of the staff for it to march at once to Hartfield to open a main dressing station in that village, and on the way to detach one company to march to Markbeech to open an advanced dressing station.

An argument which will be favourably received by the "Q" branch of the divisional staff is that everything must be done to avoid the congestion of the roads, and if No. 3 Field Ambulance marches at once it will be one unit out of the way before the 3rd Infantry Brigade begins its march to take up the line of the River Eden. It is to be assumed that the staff agree. The A.D.M.S. then, without waiting until his operation orders are written, should send orders by motor cyclist to O.C. 3rd Field Ambulance and O. i/c Divisional Motor Ambulance Convoy. These orders have already been given to you. The A.D.M.S. has in this way arranged for a new M.D. Stn. for the division to be opened at Hartfield at 2100 hours, December 2, and an A.D. Stn. at Markbeech at 0100 hours, December 3. In addition, he has two ambulance cars at Hartfield which can be used to collect casualties.

Another recommendation he should make to the staff is that the orders for the retirement of Nos. 1 and 2 Field Ambulances (less motor transport) shall be given by the Headquarters of the 1st and 2nd Infantry Brigades respectively, but that he does not propose to close the dressing stations in the 1st and 2nd Infantry Brigade areas before 2300 hours, and does not wish the field ambulances to move until after that hour.

He should, also, ask for authority to issue his own orders with regard to the march of the motor transport of these field ambulances, making it clear that it will not march before 2315 hours, by which time the roads in rear of the 1st and 2nd Infantry Brigades should be more or less clear of transport. Let us assume that the staff agrees to these suggestions and sends the necessary orders to Headquarters 1st and 2nd Infantry Brigades.

The A.D.M.S. is then able to write his operation orders which before this he was not in a position to do, not having obtained the concurrence of the divisional staff to his plans for the withdrawal of his field ambulances.

The 1st Division Medical Order No. 1 is in your possession, and in it the method by which the field ambulances are to withdraw is given as clearly as possible. It will be noted that the responsibility of obtaining the starting points, and the hours by which the field ambulances are to pass them, is laid on the Os.C. field ambulances concerned.

This is done to avoid any possibility of the march orders issued by the Headquarters of the Infantry Brigades not reaching the field ambulances. It must be remembered that the 1st and 2nd Infantry Brigades have been fighting all day, and are then presented with the most difficult of all military operations—a withdrawal when in contact with the enemy.

Everything should be done to lessen the number of messages and orders to be sent out by Headquarters of Brigades under such circumstances.

The time by which the dressing stations are to close down is given as 2300 hours, December 2, by which hour it is considered that all casualties that can be reached and removed from the line have been evacuated.

It will be remembered that, in order to make this Exercise more difficult and more interesting, it has been imagined that a motor ambulance convoy consisting of a headquarters and two sections only (i.e., fifty ambulance cars) has been allotted to the Atlantis Corps. The D.D.M.S. was, however, informed that the motor lorries of the divisional supply and ammunition companies might be used when empty, if available, for the evacuation of slight cases to the supply and ammunition railheads. The word "railheads" is used, but, as we are all aware, the railways are not working. To understand how use can be made of the lorries of the divisional supply and ammunition companies for the evacuation of slight cases from the line, a knowledge of the normal procedure by which a division in the field obtains its rations, and the brigades of artillery in action replenish their limbers, is necessary.

A division in the field obtains its rations, when it is over fifty miles from the supply railhead, through the agency of two units, the divisional supply company and the maintenance company, a Corps unit.

A divisional supply company is divided up into a headquarters and four sections, one section for each infantry brigade and the fourth section for the divisional troops, i.e., Divisional Headquarters, R.A., R.E. and R.A.M.C. units of the division. The O.C. supply company is kept informed as to where the infantry brigades are located, and also as to what divisional troops are for the time attached to them. It is obvious, therefore, that the section for the divisional troops never moves together as a section, as some of the units forming the divisional troops are always attached to one or other of the three infantry brigades. This is true especially of the field ambulances.

Let us suppose that the three infantry brigades and attached divisional troops are situated about seventy miles from the supply railhead of the division. The maintenance company loads up with rations for the division at the railhead and the lorries then proceed forward to a place which is known as the refilling point. This place is sited by the divisional staff and is usually ten to twelve miles in rear of the fighting troops, when the division is in action or contact with the enemy is expected.

The sections of the supply company proceed to this refilling point at a time decided upon by the O.C. supply company, and there the rations are divided up and the supply vehicles of the units are loaded with the rations and forage required for the following day. They then proceed forward, usually in three convoys, to the areas of the infantry brigades and attached divisional troops to places called meeting points. At these points the lorries are met by representatives from the units who conduct the supply units to what are called delivery points, which points are

usually near the headquarters of the units. At these places the rations are off-loaded and placed on the supply wagons of the units. The number of meeting points varies very largely. To avoid congestion on the roads it is best to have a separate meeting point for the supply lorries of the infantry brigades and another for the divisional troops.

The lorries of the supply company, after they have delivered the rations to the units at the delivery points, return to some place agreed upon by the O.C. supply company and the divisional staff. In the event of the division being less than forty or fifty miles from the supply railhead, the sections of the supply company load up rations for the units of the division direct at railhead, the maintenance companies are not used, and a refilling point is cut out.

In this scheme maintenance companies were not landed among the Atlantis Corps troops, but only supply details of these companies whose duty is merely to break bulk. This made it obvious that the divisions of the Corps were not expected to advance further than forty to fifty miles from the supply railheads at Newhaven and Seaford.

It is after the lorries of the sections of the supply company have delivered their rations at the delivery points that they become possible means of evacuating slight cases to the casualty clearing stations or to the base.

If it is intended to make use of them for this purpose the walking wounded collecting post for a division must be sited on a main road which the empty lorries will use on their return from the delivery points. Information as to which road will be used can be obtained from the divisional staff. In this scheme the W.W.C.P. of the 1st Division has been sited at Edenhurst, and it is assumed that all empty lorries will pass this place on their return from the delivery points to the supply railhead of the division at Seaford, as it may be assumed that they will certainly be directed to proceed there after delivering the rations. As they come to Edenhurst they should stop at the W.W.C.P. for the short time necessary to take up slight cases, if the divisional staff has agreed to their use for the evacuation of such cases. They will then proceed direct to Seaford and *en route* must pass through Newhaven, where the slight cases can be put down at the casualty clearing station acting as a reception hospital and, later, marched on board an ambulance carrier or hospital ship.

In this way the sections of the supply company can render valuable aid in evacuating slight cases when the medical services have not, as has been imagined in this Exercise, adequate transport of their own.

Os.C. Supply Companies always object to carrying slight cases in their lorries. This objection is founded on their experience in the early days of the Great War when M.A.C's. did not exist and the only link between the field ambulances and the casualty clearing stations was the divisional supply column, now known as the maintenance company. These supply columns had to run to a time-table, and it was very difficult for the drivers to push

along at their proper speed owing to the suffering caused to the wounded they were carrying on their return journey to the railhead. In this scheme it is not proposed to use the lorries of the supply company for the conveyance of any wounded, except really slight cases who can look after themselves and be carried at any speed without fear of injury.

If permission is given to use such lorries they must not be delayed more than a few minutes at the W.W.C.P. The casualties must be ready waiting and short ladders should be prepared by means of which the slight cases can climb rapidly into the lorries. It is not easy for a man even when unwounded to climb into a lorry when carrying his equipment. All equipment worn by a slight case and his rifle should be evacuated with him. The diagram given on p. 419 is intended to illustrate what has been written above.

With regard to the supply of ammunition to batteries in action :—

Ammunition is sent up from the base to the ammunition railhead, in this case Lewes, and normally would be taken over by the ammunition section of the maintenance companies and forwarded to an ammunition refilling point, one for each division.

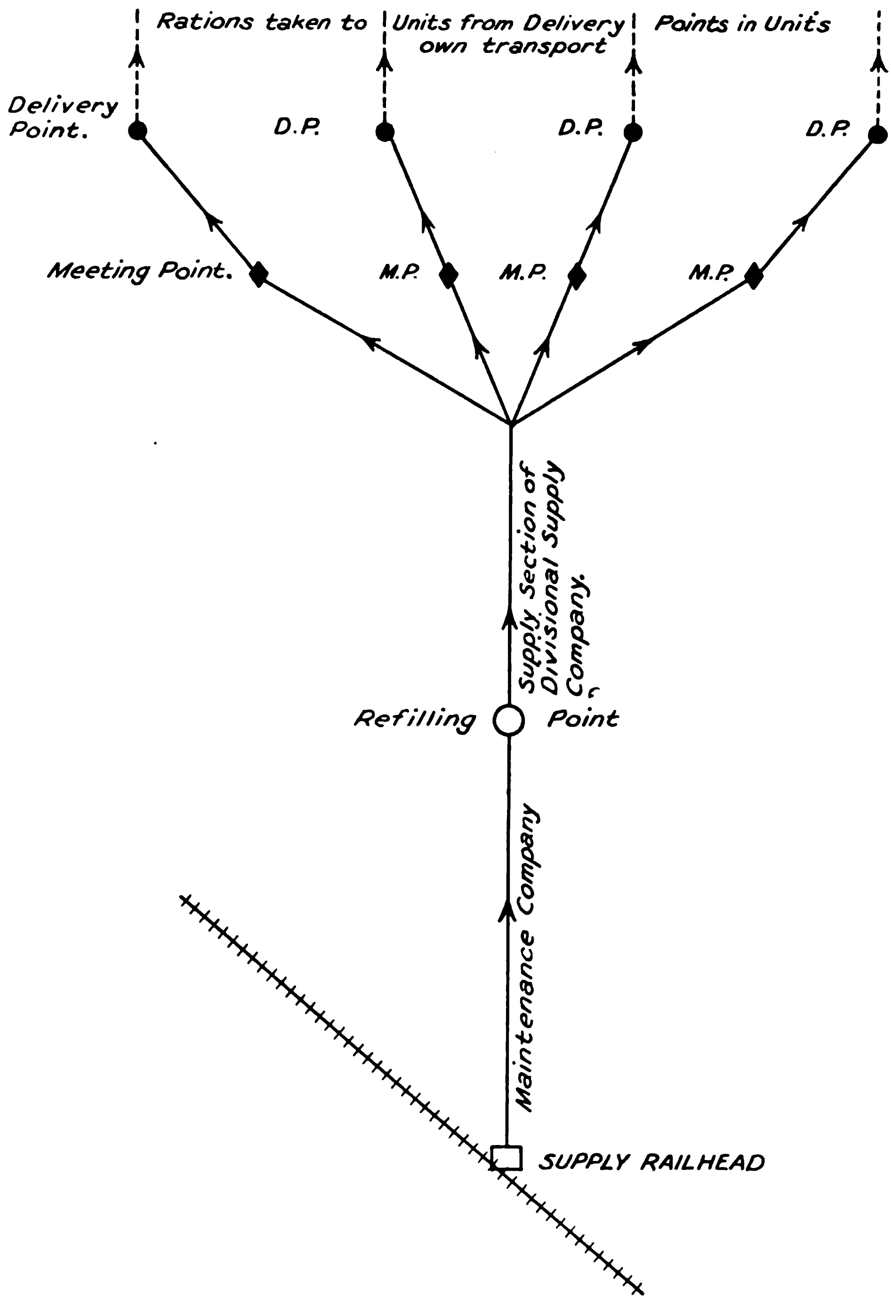
In the operation we are considering there are no ammunition sections, as there are no maintenance companies given in the Order of Battle. A depot of ammunition would be formed at Lewes by the divisional ammunition companies themselves and from this depot the lorries of the ammunition companies would be kept full. It is to be imagined that at the beginning of the action on December 2 the ammunition company of the 1st Division was situated at some point about ten miles in rear of the wagon lines of the batteries in action, and that when more gun ammunition was required application was made by the battery commanders to the forward ammunition point, and on receipt at this point orders are sent to the ammunition company to send up the required ammunition to the wagon lines of the batteries in need of it. No ammunition is kept at the forward ammunition point. It is a place at which demands are received and passed on to the ammunition company. If we can site the W.W.C.P. on a road which must be used by some of the ammunition lorries on their way to and back from the wagon lines, it follows that when they are empty they could, if authority has been obtained, load up with slight cases and take them to Lewes, as empty lorries would certainly proceed there to load up with ammunition again. The W.W.C.P. has been sited on such a road.

We will assume that empty lorries of the supply and ammunition companies have been available to evacuate casualties due to the action on December 2, and will now consider what grounds the A.D.M.S. has for his order that the dressing stations of the 1st Division are to be closed by 2300 hours.

To close the dressing stations at this hour is to assume that all wounded will by that time have been evacuated.

The casualties of the day's fighting on December 2 are given as 20 per cent of the battalions engaged. Some casualties will have occurred also in

the infantry battalions in support and reserve and in Field Artillery, Engineer and Field Medical Units, but they can be neglected as the great majority of the casualties will have occurred in the infantry battalions which have been closely engaged with the enemy. These battalions are six in



number. A battalion at war strength comprises 831 of all ranks. These six battalions number 4,986 of all ranks, of which number twenty per cent, i.e. 997, are casualties. Of this number one in four can be considered as killed in action which gives the number of dead as 249 in round numbers. This number, 249, subtracted from 997, gives us the number 748, which represents the number of wounded which will require to be evacuated from M.D.S. and W.W.C.P. to the casualty clearing stations. If we take the figures given in "R.A.M.C. Training" as correct, 40 per cent of 748 will be lying cases, i.e. 299, and 60 per cent sitting cases, i.e. 449. Of these sitting cases it can be estimated that 30 per cent are trivial and do not require ambulance transport from the W.W.C.P. to the casualty clearing stations. This thirty per cent gives us 135 slight cases and leaves 314 sitting cases to be evacuated by the motor ambulance convoy cars. It has been imagined that owing to commitments elsewhere Atlantis is unable to provide more than a headquarters and two sections of a M.A.C., i.e. fifty ambulance cars instead of seventy-five. Of these 50 ambulance cars it is considered that 35 have been allotted by the D.D.M.S. Atlantis Corps to clear the medical units of the 1st Division, and only 15 to the 2nd Division. It must be remembered that the 2nd Division has only one infantry brigade in action, and one in reserve, as its third infantry brigade is holding a position covering Newhaven. An ambulance car can carry four lying cases and two sitting. Let us suppose that a car can go to and return from Uckfield, the medical railhead of the Atlantis Corps (sixteen miles from the M.D.S. of the 1st Division) in three hours. If so, in three hours the thirty-five cars will have carried 140 lying and seventy sitting cases. In theory in six hours 280 lying and 140 sitting cases will have been evacuated from the M.D.S. of the 1st Division. In actual practice nothing like this number will have been evacuated. It is not unreasonable, however, to suppose that by 2000 hours, December 2 (eleven hours after the battle began), these numbers, 280 lying and 140 sitting cases, will have been evacuated from the 1st Division M.D.S. to the casualty clearing stations at Uckfield. There will remain to be evacuated 19 lying and 174 sitting cases. Five cars can take the lying cases and ten of the sitting cases. This leaves thirty cars for the remaining 164 "sitters."

From the above it is not unreasonable to suppose that the M.D.S. of the 1st Division will be clear by 2230 hours, December 2, in spite of the congested condition of the roads after 1800 hours, at which hour the retirement of the 1st Division was allowed to begin. To return to the 135 slight cases which will have been collecting all day at the W.W.C.P. If permission has been given to use the returning empty lorries of the divisional ammunition company, a large number of these cases will, before the order to retire has been received, have been cleared to the ammunition railhead at Lewes. The O.C. W.W.C.P. will have taken care that the more seriously injured of the slight cases will have been evacuated first. The very slight cases should be left to the last as they could, if the

necessity should arise, be withdrawn by march route to some place behind the line of the River Eden to await wheeled transport to the base. The number of slight cases evacuated from W.W.C.P. by means of empty ammunition lorries will depend, of course, on the expenditure of gun ammunition by the artillery of the 1st Division. The action has been a heavy one and in consequence much gun ammunition will have been expended. It can be considered, therefore, that about sixty of the more seriously wounded among the slight cases will have been evacuated as far as Lewes by these means. On arrival at Lewes these slight cases would, under orders of the D.D.M.S. Atlantis Corps be taken over by the Headquarters of the 6th Field Ambulance, which unit, you will remember, was attached to the 6th Infantry Brigade of the 2nd Division holding the line covering Newhaven. We have thus disposed of sixty slight cases, but by 1800 hours, December 2, we shall have about seventy-five cases at the W.W.C.P. awaiting evacuation.

The cars of the M.A.C. are working at high pressure evacuating the M.D.S., and are being much hindered in this work owing to the congested state of the roads, and are not available for this purpose. If we have obtained permission to make use of the empty returning lorries of the divisional supply company, the evacuation of these seventy-five cases presents no difficulties. The lorries of the supply company can be considered as having gone forward to the delivery points by 1830 hours. These delivery points must, from the position of the fighting units of the division, be in front of the W.W.C.P. at Edenhurst. The lorries when empty can on their return journey stop at the W.W.C.P. and take up the slight cases and proceed with them to the supply railhead at Seaford, dropping their cases *en route* at the reception station at Newhaven. It is, of course, possible that as a retirement has been ordered the lorries of the supply company will not proceed forward to the delivery points but will dump their rations at places ordered by the divisional staff, at which places the retiring units of the division can pick them up. This procedure was carried out in the retreat from Mons. It is not likely, however, that such a change would be ordered. The withdrawal is an orderly one and the countermanding of orders often leads to disorder. If such counter orders are given, the lorries of the supply company will not be available, and other arrangements must be made. These can only be the removal of the slight cases by march route or the detailing of cars of the M.A.C. to carry out their evacuation to the prejudice of that of the lying and sitting cases. It must be remembered, however, that in a retirement in civilized warfare it is of more importance to evacuate slight cases which will soon be fit for duty again than to clear serious cases which are not likely to be fit for service for months, if ever. Another possibility is for the D.D.M.S. to make use of the ambulance cars of the Corps field ambulance for clearing the W.W.C.P. It is very unlikely that they would be available for this duty.

From the above it is considered that the A.D.M.S. is justified in ordering the dressing stations of the division to close down at 2300 hours, December 2. He has in his orders, however, left a holding party with horsed ambulance transport in the closed main dressing station. The reason for this is that if any wounded should arrive after the dressing station is closed they can be cared for. The needs of the divisional cavalry regiment have also not been forgotten.

It will be seen from the location statement of the medical units that a divisional motor ambulance convoy has been formed. This is an unofficial unit but, under certain circumstances, it is invaluable as it ensures that the advanced dressing station which is taking in the most casualties gets the most ambulance cars to clear it. The certain circumstances mentioned above are that the casualties are heavy, that the roads from the advanced dressing stations to the main dressing station are such as to enable a circuit of cars to be maintained, and that the division is going to make a deliberate attack, or is holding a defensive position.

A motor ambulance convoy is formed by pooling all the available cars of the divisional field ambulances. Let us suppose that of the eighteen ambulance cars in the division sixteen are available for duty as a convoy and, as in this case, the roads make it practicable to employ this unofficial unit. An officer should be appointed by the A.D.M.S. to command it, and the necessary orders issued as to when and where the cars are to assemble to come under his orders. This place, which must be on a main road of evacuation to the main dressing station, becomes the headquarters of the convoy. In the case of this Exercise it is a quarter mile north of Edenhurst. The sites of the dressing stations are, of course, known to the O.C. Convoy.

At some hour before the action is due to begin he should post two cars at or near each advanced dressing station, and on each of the roads selected for evacuation of casualties to the main dressing station from the advanced dressing stations a car post of three cars should be formed.

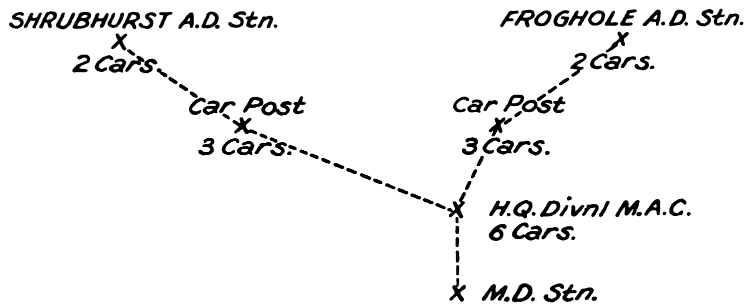
The O.C. Convoy has thus used ten cars, which leaves him six. These six cars should be parked at the headquarters of the convoy; this is on a road which must be used by loaded cars bringing wounded to the main dressing station from the advanced dressing stations. The cars at the car posts and the headquarters of the divisional motor ambulance convoy should always be parked off the road so as not to interfere with traffic.

Let us suppose that a car is loaded with wounded at the advanced dressing station at Shrubhurst. It proceeds to the main dressing station and *en route* passes the car post of three cars. Immediately it has passed, the N.C.O. i/c of this car post sends forward one of his three cars to Shrubhurst to take the place of the loaded car. The loaded car on its way to the main dressing station must pass the headquarters of the convoy. It stops for a moment to state from which car post it has come, and immediately one of the six cars in reserve at the headquarters goes forward to the

car post to take the place of the car which has proceeded to the advanced dressing station at Shrubhurst. The loaded car when it has been unloaded at the main dressing station, and has received stretchers, splints, blankets, etc., in lieu of those removed with the wounded, proceeds to the headquarters of the convoy to remain there in reserve until its turn comes round to go forward to the car post and advanced dressing station.

In this way a circuit of cars is established and the advanced dressing station which is receiving the most casualties gets the most cars to clear it.

The identical procedure is carried out in the case of cars coming from the advanced dressing station at Froghole. It must be emphasized that while a divisional motor ambulance convoy is invaluable, when it can be formed, in some cases it cannot be formed. It is a *sine qua non* that the roads are such as make it possible to establish the circuit of cars. Another advantage of the convoy formation is that the drivers are given intervals of rest at the headquarters of the convoy, and opportunity is given for the cars to be examined and minor running repairs carried out.



To enable this to be done, a repair lorry with motor mechanics should be applied for from the O.C. R.A.S.C. of the division. The O.C. Convoy is responsible that directing signs are put up at every road junction and cross roads where there is a possibility of cars taking the wrong road. These directing signs will be invaluable to prevent walking wounded proceeding to the W.W.C.P. losing their way. The diagram given above may help to make the explanation of the working of a divisional motor ambulance convoy more clear.

The M.G.A. Eastern Command, Major-General G. W. Howard, replied to the proposal to make use of the returning empty supply lorries for the evacuation of casualties to the effect that he was not in favour of it. Nothing in his opinion should be allowed to be a possible cause of disorganization of the supply services of a division. If, as in this scheme, the medical services were short of transport for the wounded, he would much prefer to make use of some of the lorries of the baggage company. The blankets could be dumped in some convenient place and the empty lorries made use of to carry the slight cases as far as Lewes. The troops in the scheme being considered would certainly not have any chance of receiving

their blankets before daybreak on December 3. Long before that time all wounded would have been evacuated and lorries used for slight cases would have ample time to recover the blankets dumped.

The C.-in-C. Eastern Command, General Sir Webb Gillman, then spoke. He said that while inspecting the sites chosen as dressing stations for the medical units of the 1st Division he was impressed by the difficulty which would be experienced by the slight cases in getting to the W.W.C.P. from the advanced dressing stations. Motor ambulance transport would not be available for them, and if some of the horsed ambulance wagons of the field ambulances were used the horses would be exhausted in three or four journeys, and the field ambulances possess no spare horses for these wagons.

The slight cases would have to march a distance of about four miles from the A.D.S. at Shrubhurst and about 2½ miles from that at Froghole. He realized that the nature of the country and the roads made it impossible to site the A.D.S. for the left of the 1st Division nearer the main dressing station. In his opinion some special means of motor transport was required to carry slight cases from the A.D.S. to the W.W.C.P.

It was unnecessary, except when a place had definitely to be "pin pointed," to describe its locality by six co-ordinates. Four should be sufficient and a saving of time is effected. The grid letter is not required and no confusion could arise if the letter were omitted.

Some further discussion ensued, and among the points raised was one of how the casualty clearing stations at Uckfield would be cleared to Newhaven, and another was what transport could be employed to move the casualty clearing stations in the first place to Uckfield and to remove them to Newhaven as part of the retirement of the Atlantis Corps.

The Director stated that as no cars of the M.A.C. would be available, the D.D.M.S. Atlantis Corps would have to carry out the evacuation of the casualty clearing stations at Uckfield by forming a motor ambulance convoy out of the ambulance cars of the 6th Field Ambulance and the Corps Field Ambulance. Serious cases could be moved by these cars and any slight cases that might be collected at Uckfield by means of commandeered motor transport or lorries supplied by the "Q" branch of the Corps staff.

The transport of the casualty clearing station from Newhaven to Uckfield and back again would have to be carried out by means of the 1st Reserve M.T. Company.

He considered that the present casualty clearing station is quite unfit a unit for mobile warfare. It has no transport of its own and is far too cumbersome. It is really a hospital and is quite unable to carry out the duties which would be required of it in mobile warfare owing to its immobility. Even the light section of a casualty clearing station requires nine 3-ton lorries to move it. In mobile warfare he would rather have the clearing hospital of 1914 or an enlarged headquarters of a field ambulance to act as a casualty clearing station.

This closed the conference and Narrative No. 3 and Problem No. 4 given below were issued to the Syndicates.

Narrative No. 3.

The retirement of the Atlantis Corps was carried out according to plan without interference on the part of the English forces.

The rearguard of the 1st Division (3rd Infantry Brigade) was not in touch with the enemy until 1500 hours, December 3, when enemy mounted patrols made their appearance. His infantry was not seen.

Orders were received from Corps Headquarters for the 1st Division to continue the retirement (in touch with the 2nd Division) on Newhaven. The retirement of the 1st and 2nd Infantry Brigades and attached troops to the area Hadlow Down 9J—Buxted 9J—Uckfield 9J—Little Horsted 9J is to commence at 1600 hours, December 3, that of the 3rd Infantry Brigade not before 2130 hours.

The 3rd Infantry Brigade with its attached troops is to act again as rearguard to the 1st Division and will deny to the enemy the line Groombridge 9H—Withyham 9H—Hartfield 9H (incl.).

The 2nd Division covered by a rearguard in touch with the 3rd Infantry Brigade is to retire on the left of the 1st Division.

Problem No. 4.

Reconnoitre the area in rear of the Groombridge—Withyham—Hartfield line with a view to the selection of an advanced dressing station for the 3rd Infantry Brigade on December 4.

The 3rd Infantry Brigade is to hold the Groombridge—Hartfield line as follows :—

Right Battalion.—Alkesford Farm Q960550—Motts Mill Q956541 area (not given on maps).

Centre Battalion.—Little Stoneland Q948556—Balls Green Q937552 area.

Left Battalion.—Hartfield—Newtons Hill area (Q9154).

Reserve Battalion.—Lyegreen area Q947532.

On December 4, after reconnaissance of the area in rear of the Groombridge—Withyham—Hartfield line the Syndicates met the representative of the "G" branch on the Directing Staff, Lieutenant-Colonel A. P. Garnier, and he explained exactly how the troops of the 3rd Infantry Brigade would, in his opinion, be disposed so as to deny this line to the enemy.

The O.C. field ambulance responsible for the collection of casualties from an infantry brigade cannot make adequate arrangements unless he knows exactly where the different units of the brigade are.

After some discussion as to where the A.D.S. to serve the 3rd Infantry Brigade should be sited, the Exercise came to an end.

It is regretted that owing to the necessity for economy it has not been possible to reproduce the maps in any detail, but it is hoped that readers will be able to follow the narratives, etc., from the reproductions given.

DISINFECTION.[1]

By Major T. O. THOMPSON,

Royal Army Medical Corps.

I must apologize in the first place for the rather scrappy set of notes which comprise this paper.

My excuse for taking the subject of disinfection is that it is not only a subject with which we all come in contact at some time, but there appear to me to be distinct possibilities of change or improvement in our methods, and there are points on which discussion or controversy has been, is, and can still be raised.

Disinfection has been defined as, "The destruction of agents causing infection," but in the last point on which this paper touches, I suggest that we should regard disinfection from the even wider aspect of "the *prevention* of agents causing infection."

It will be noted, in considering the history of disinfection, that in the earlier periods the effort was to prevent the spread of contagion rather than the actual destruction of any known cause of disease. With our modern advance in knowledge of the causes of many diseases, we can assuredly often go a step further than the mere destruction of the agent causing infection, and can forestall that agent by preventing its spread from the very source.

If we consider diseases which are caused by infective agents, known or unknown, as being a repetition of a "link-circle" of infection following definite routes, then methods of cutting those links by prevention of spread to susceptibles are closely allied to prevention by destruction of the agent.

Rosenau [1] writes: "It is better to prevent infection than to be compelled to destroy it after it has been disseminated through ignorance and carelessness."

In the concluding portion of this paper I therefore propose to glimpse at this wider aspect of disinfection, especially in its relation to ourselves.

The history of the development of methods of disinfection up to the modern methods has naturally followed the developing knowledge of the period as to the causes of disease.

As our knowledge increased and definite infecting agents were found or routes of infection were traced, so the generalized ancient methods have given place to specialized restricted methods of disinfection or disinfestation directed against a particular organism or route of infection.

It is on these lines, I think, that still further progress should be made. The changes, however, have been of comparatively recent date.

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[1] A Paper read to the Army Medical Officers of the Aldershot Command.

Substances employed even now have been in use for many centuries.

Fire, from earliest history, has been used by many races as a purifier and a symbol of purification.

Sulphur has also been employed from earliest times and there are many descriptions of its use. Ulysses, in the Odyssey, says to his old nurse:

"Old woman, bring me *sulphur* and *fire* in order that I may free the air of its poison and purify this palace."

In the time of Hippocrates sulphur was regarded as an antidote against plague.

Plutarch mentions the arrest of an epidemic of plague in Athens by the lighting of fires in the middle of public places and streets; and the lighting of fires has been regarded as a disinfection of the air against plague until quite recent times.

In all these cases it will be noted that disinfection of the *air* is aimed at, because the spread of the majority of the known diseases, especially epidemic diseases, was then regarded as being due to effluvia carried through the air. It is only in quite recent years, since the discovery of organisms and their modes of infection, that any real change has been brought about in the methods of disinfection.

For many centuries *deodorants* held the field as disinfection methods, to be succeeded later by methods aiming at disinfection or sterilization of the actual air in which organic vapours, or molecules, or bacteria were floating. Even now methods of this type are in vogue and are hard to eradicate.

Some of the following quotations are interesting and perhaps amusing in the light of our present knowledge, but they represented the acme of knowledge of the period.

In a copy of a learned book on medicine written by Friar Moulton, which I am fortunate enough to possess, which was published and printed in 1656, certain sections are devoted to the subject of prevention of infection and disinfection.

The book is entitled:—

"The Compleat Bone Setter
whereunto is added
The Perfect Oculist
and
The Mirror of Health."

The following instructions as to disinfection and against infection are given: "How the Body is to be Governed against Peſtinlential and Infections Ayres."

"Also when you ſleep, either in the afternoons, or at night abed, shut your chamber doors and windows cloſe; and caſt on a Pan of Coles this powder following. Take of Laurel leaves and Rosemary dried and Frankincenſe of each a like quantity, make them into a powder and throw about half a ſpoonful hereof upon the coales."

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And again in another section :—

"Then the ſickneſs of the Peſtilence cometh thus.

"When the pores of the body are open, then firſt entreth the Venomous and corrupt Air."

And in still another section :—

"Against infection."

"In the morning always before you go abroad . . . waſh your mouth with Vinegar where in Wormwood hath been boyled and afterwards hold in your mouth a bit of Zeadoary root, Citron peels, Tormentil, Anglica or Unicorn's horn."

You will note that it is deodorants and strongly smelling substances which are used to counteract the noxious airs and effluvia, which were considered to be given off by the bodies of the diseased. Disinfection was to be obtained by a combination of the deodorant with this effluvium.

Although bacteria were discovered over two centuries ago by the Dutch naturalist Leeuwenhoek, little alteration was made in ideas as to infection until after the middle of the last century, following the study of pathogenic bacteria by Robert Koch and Pasteur.

After the odour and effluvia theories, which were prevalent up to that time and even later, the tendency was to regard infection as due to substances, minute chemical substances, which floated in and were conveyed by air; and methods of disinfection, taught in the middle of the last century, were directed to the purification of the air.

Parkes [2], when Professor of Military Hygiene in the Army Medical School, divided his teaching of the methods of disinfection in his book on hygiene into: (1) air purifiers; (2) sewage deodorants; (3) disinfectants.

The first were the predominating consideration and are given at length. They comprised :—

Solids, such as earth, quicklime, charcoal.

Liquids, such as permanganate, zinc chloride, nitrous acid.

Gases, such as ozone, chlorine, bromine, sulphurous acid, vinegar and ammonia.

In a later paragraph the action of heat by hot air is given as the best and most certain method for the disinfection of clothing.

The whole tendency, although bacteria were recognized as being present in the air, was still to go for disinfection of the air itself or destruction of "floating organic vapours and molecules of whatsoever kind" by means of pungent or strongly smelling substances, rather than to attempt to kill the bacteria.

It is significant, however, of Parkes' critical mind that he would not commit himself as to how these vaunted substances acted, if at all, as true disinfectants. He states, when discussing air purifiers and disinfectants :—

"The mode of their action can only be surmised as we are entirely ignorant of the nature of any of the agencies causing the infectious diseases."

As a further and later example of the air-infection theory, let me cite

the following from the reminiscences of Colonel W. A. Morris published during 1930 in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS [3].

Colonel Morris narrates how the General gave him one of the hardest day's work of his life by insisting on draining the subsoil water from beneath a barrack-room because the effluvia from the foul water was producing cholera in that barrack-room. The General pointed out that a number of cases of cholera had occurred in different places in that barrack and at the Fort simultaneously.

"I then made the obviously reply that they were infected by the same agency," he writes. "No," the General answered, "*It is carried by the air.*" "This air theory was also held by the Surgeon-General of the Government of India."

Colonel Morris did not apparently approve at all either of the work or of the idea.

Then again, at a later period, when discussing an enteric outbreak at Campbellpore, he says [4]:—

"I was always a sceptic of the old-fashioned disinfection from the days at Allahabad when I was ordered to burn 4 ounces of sulphur in a street in the Regimental Bazaar to ward off cholera and astonished my Chief by indenting for 14 pounds for one barrack-room."

Incidently at the time he was on the trail of enteric infection spread through "the sale of the effects of deceased soldiers" and finishes the paragraph thus:—

"The humble note from Campbellpore in 1897 started the more careful disposal of clothing and the disinfection of stores. From that period all enteric clothing, bedding and equipment was marked with an 'E' and kept separate. Disinfection was carried out under the old rules, but I remained sceptical of its efficacy, and indeed I doubted if an effective disinfection could be obtained except by heat or boiling."

While on the subject of clothing infected from enteric cases, it may be of interest to mention that some years later Klein actually isolated typhoid organisms from blankets returned some months after use in the South African War.

After the discoveries of Koch, the tendency was to regard bacteria floating in the air as the source of infection, not, however, visualised as "droplet infection," and disinfection was definitely directed to that source as well as to fomites and all articles in the neighbourhood of the sick.

This led to the ruling of Section 120 of the Public Health Act of 1875 requiring the complete disinfection of a house, or articles therein, after the occurrence of infectious disease, if the medical officer certified that disinfection would tend to prevent such disease.

About 1880 there were several discoveries bearing on the subject. Nageli discovered that bacteria were not given off by moist surfaces.

Merk showed that disinfection and the destruction of pathogenic organisms could be obtained by the use of steam.

Flugge demonstrated that the spread of tubercle bacilli was mainly through droplet infection and rarely, if ever, by inhalation of dried bacilli.

It is interesting to note that the earlier methods, employed for many centuries before the advent of more exact knowledge, were often quite effective as methods of disinfection or prevention of particular diseases, because the real route of infection was some insect vector, and the method employed cut the "link of the route," rather than actually destroying any infecting organism. For example, the use of fire and sulphur mentioned before against plague may well have had deterrent effects on the rat and the flea.

These methods were blunderbuss in type and massive in method, resulting in complete and wholesale disinfection of everything which had come into close or remote contact with the diseased person. The reason for this was, I think, because although the organisms of various diseases were by this time beginning to be known, and the probable route of infection in some cases shown to be "droplet infection," yet knowledge was not sufficiently secure and certain to allow of a definite specialized attack on the organisms at one phase or period only. The result was the blunderbuss type of attack employed in the hope that all chains of infection would be cut, even though they were not actually known. This tendency is still obviously present even to this day in certain diseases, when we are perhaps not quite sure of our ground, or in which we pander to the feelings and ideas of the lay public.

The methods of this period consisted chiefly of the following:—

(1) Barriers of chemical disinfectants and deodorants in the sick quarters, or between sick quarters and others.

(2) Considerable attention to the hands and clothing of attendant personnel, but little or no attention to the droplet infection of the upper respiratory tracts of that personnel.

(3) Terminal disinfection of a very thorough and extensive nature. This terminal disinfection was carried out by means of the following methods:—

Burning of cheap articles.

Steam disinfection of bedding, etc.

Articles liable to damage by steam were either treated with chemicals or *left untouched*.

The room was treated by gaseous disinfectants such as:—

Sulphur, 3 lb. to 1,000 cubic feet.

Chlorine, 3 lb. of chloride of lime and 3 lb. of hydrochloric to every 1,000 cubic feet.

Phenol evaporated from hot shovels or other apparatus.

Formaldehyde from various pattern lamps and substances, i.e., the Trillatt lamp and the Autan process.

Finally, the whole room would be scraped, plastered, papered, or painted.

These methods, the cause of much trouble and expense, were prevalent for some thirty years until inquiring minds began to cast doubt on their efficacy or need. Gradually, once more, two schools of thought separated out: those who maintained the need of full terminal disinfection, and those who considered that current disinfection of discharges with a terminal cleansing with soap and water was ample.

The second method was evolved by a number of workers, but Dr. C. V. Chapin, of Providence, U.S.A., produced the first large scale experiment on these lines and Currie summarized the results in the following table, comparing the figures from Baltimore with those of Providence. Terminal disinfection was carried out in the former, but not in the latter.

	Terminal disinfection Baltimore, 1903-1909	No terminal disinfection Providence, 1905-1911
Diphtheria—Cases ..	931 ..	4,189
Fresh incidence ..	1·60 per cent ..	1·64 per cent
Scarlet fever—Cases ..	3,029 ..	1,801
Fresh incidence ..	3·8 per cent ..	1·72 per cent

Fresh incidence means cases traceable to direct infection from a discharged case (return cases).

In post-war years these views led to much controversy, and even now there are "diehards" who go for as large a measure of safety as possible and insist on complete terminal disinfection in all cases. For instance, in a recent publication, W. Spät [5], an earnest advocate of terminal disinfection, states:—

"The disinfection of houses is a most important link in the chain of measures we possess to overcome infectious disease . . . these methods are essential after all infectious diseases except Tetanus and Malaria. . . .

"If practical results . . . are not always what is desired, it is because there is insufficient understanding of the method which thus becomes merely a symbol."

But with the increase in knowledge of the routes of infection, the tendency to concentrate on current disinfection in place of a final disinfection has gradually gained ground.

Extracts from the writings of those taking part in the controversy, however, show that differences of opinion existed even amongst these workers.

K. Simpson [6], at Barking, considered that:—

(1) Smallpox and open tuberculosis were two infectious diseases "par excellence," requiring complete disinfection of fomites and premises.

(2) Typhus, relapsing fever and trench fever required not only disinfection, but disinfestation of patients, contacts and premises.

(3) The typho-dysenteric group, except for disinfection of excreta and immediate discharges, required nothing more than ordinary cleanliness.

(4) There was a fourth group, including the majority of infectious diseases, where the need for home disinfection lacked support, because they are diseases spread by carriers, and the causative organisms exist

apart from the body for very short periods, and only recently soiled fomites require disinfection.

Duncan Forbes [7] at Brighton discarded terminal disinfection in scarlet fever and diphtheria, and issued a pamphlet to the housewives of Brighton to the effect that disinfection would not be carried out except in the case of smallpox, in which spraying would be employed, and that simple laundering with boiling of soiled materials would meet the ordinary case.

In tuberculosis he also considered that if damp dusting and sweeping and laundering are carried out thoroughly, the chances of infection from dust are practically nil.

E. W. Goodall, of the Metropolitan Asylums Board, has relied for years in his fever hospitals solely on disinfection of actual discharges, with spring-cleaning of rooms and laundering of linen. He has also used one receiving room for all cases without adverse results.

James Russell wrote that even as far back as 1880 in the Isolation Hospital of Glasgow he had relied solely on current disinfection and ordinary cleansing and laundering.

Kenwood and Marchant [8], however, disagreed with most of this teaching, on the grounds that we were not sure that surrounding articles were not a source of infection; that infective elements are often given off in a room within twelve to twenty-four hours of further occupation by susceptibles, and these infective elements can undoubtedly survive beyond that period; and that we should always go for as large a margin of safety as possible.

Wheatley [9], the Medical Officer of Health of Salop, considered that each disease required action in accordance with the type, the presence of recognized carriers, the kind of nursing, etc., and that final disinfection cannot take the place of good current prevention.

Chagas [10] finally summarized the situation thus :—

The methods of prevention should be based on the fundamental idea that the sources of infection are living beings and not inanimate objects. This conception must result from the knowledge that pathogenic germs do not survive long when they are expelled from their host. The principal factors in the spread of infection are the case itself and atypical cases, carriers, and living vectors. Practically all sanitary measures should have this end in view. Terminal disinfection of places and inanimate objects by means of fumigation and liquid disinfectants is an anachronism, and has no practical justification. It may even be dangerous in that it is apt to give a false sense of security. Terminal disinfection as practised at the present time should be replaced by the simpler method of domestic cleaning of rooms and things which have recently been in contact with the case. Disinfection of discharges and infective material during the course of the disease is, on the other hand, a necessity, and if properly carried out, renders terminal disinfection unnecessary.

Thus we come to the present types of disinfection and our own regulations as to methods.

Our regulations lay down the following instructions [11] : for the following diseases terminal disinfection shall be complete : Cholera, puerperal septicæmia, pneumonic plague, tuberculosis and smallpox ; and for a number of others there shall be local disinfection, namely, dysentery, cerebrospinal fever, influenza, anthrax, pink eye, pneumonia, and so on.

Local disinfection means disinfection of bedding, bedstead, walls, floor and surfaces for a space of six feet, and of all articles around the bed, including shelf, locker and its contents.

Complete disinfection means disinfection of the whole contents and interior of the room. A room of less than 200 square feet will always require complete disinfection.

The methods of disinfection employed now are :—

(*a*) Scrubbing with or soaking in 2½ per cent cresol.

(*b*) Spraying completely and thoroughly, inch by inch, with a five per cent solution of formalin and then closing the room for a period of six hours.

The operator is to put on overalls, but no mention is made of a mask to protect him from the infection which is still supposed to be there while he does his work. After spraying and closing the rooms, the rooms will be completely ventilated and dried.

(*c*) Where considered necessary, in complete disinfection, the walls of a room may be scraped and repapered or distempered.

(*d*) Articles not damaged by steam will be disinfected by steam. These include clothing, bedding, and mattresses which will be taken for disinfection in special vehicles or enclosed in cresol-soaked sheets.

I do not propose to go into the methods of steam disinfection but, put briefly, they vary from the high-pressure expensive and elaborate proprietory disinfectors to the simple type which uses "downward displacement" of steam in lieu of pressure appliances—the Lelean sack, the drum, the Serbian barrel, the mulepack and even the improvised packing-case.

Downward displacement of steam still appears to be neglected by makers of commercial disinfectors, but it has been stated that tests proved that anthrax spores can be killed in some six minutes by this method, and I can confirm that materials lightly contaminated with solutions of horse manure are sterilized by a thirty-minutes exposure.

But is it necessary to carry out disinfection on these lines and to this extent?

It is true that regulations as to the scraping of walls, etc., give us a very useful lever in getting the Royal Engineers or Military Works to carry through certain desirable cleansings and paintings. But can we seriously think that infection will penetrate plaster or mattresses and from there be capable of reproducing that infection?

From a consideration of the foregoing remarks and our present state of knowledge of the methods of infection, are we still justified in using and teaching these methods and in our example to lay folk? May we

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not be using methods merely for "eye wash," while allowing other urgent factors to go unremedied?

I think we have reached a stage when we should take stock and perhaps alter our methods, just as we have already done for many "infectious" diseases.

As an example of "infectious" diseases for which the methods of prevention have had to be radically changed with the modern insight into methods of spread, we have dengue which, even in the 1908 edition of Firth's "Hygiene," was called a highly "infectious" disease and treated as such, although, even then, the mosquito *Culex fatigans* was talked of as a means of spread.

Let me also recall the progress in "Cutting the Link" of yellow fever, a disease endemic in Central America and epidemic even in Europe, in Lisbon in 1857, when there ware 13,757 cases with 5,625 deaths, and in Swansea in 1856, when there were 70 cases with 50 deaths.

In 1793 it was regarded as a divine visitation which could not be prevented or checked. In 1800 it was regarded as a spontaneous generation from filth, heat and moisture. In 1878 fomites and articles of use were regarded as the link of infection; and absolutely rigid disinfection of such was enforced up to 1899.

But Reed and Carrol slept in soiled bed clothing to show that the infection theory was wrong, and that disinfection of fomites was unnecessary to prevent infection. Then subsequent work definitely showed the mosquito to be the infecting link, and that preventive methods should be directed against that source.

A truly remarkable example of a disease, which at one period was regarded as requiring the most rigid quarantine and disinfection, and for which, in the end, all measures of disinfection, other than anti-mosquito measures, could be dropped.

Surely then our present knowledge of practically all diseases for which disinfection is carried out is now sufficient to consider that it is the Case, the Missed, Mild or Convalescent Case, and the Carrier who are the real sources of danger and actual infection, rather than inanimate objects with which he has been in more or less remote contact.

Bacteriological effort repeatedly fails in its attempts to propagate or keep alive the delicate organisms of the diseases against which disinfection is being constantly carried out or alleged to be carried out. Surely then these organisms are too delicate to survive on inanimate objects round a patient?

It is interesting to note in this connection that Lehmann has recently shown that even suppurative cocci die off on linoleum and on wood treated with linseed oil within twenty-four hours. Even if infective organisms survive twelve, twenty-four, forty-eight hours or even many days, will they ever reach a fresh susceptible in such a form as to infect him? The most probable way is by dust, which implies drying and therefore greater likelihood of death of the organisms.

It is true that examples can be picked out where pathogenic organisms have been found alive on clothing or bedding after long periods, *vide* Klein's results with blankets after the South African War. But the chances of infection from such a source should be small; men do not eat or even lick their blankets. Possibly wet hands might become infected after much handling. Such soiled blankets should, however, have been included in the current disinfection.

Even if some organisms do reach the fresh susceptible, will the dosage be sufficient to give real risk of infection? It will probably be too small.

It has been shown that tubercle bacilli are viable in dust for prolonged periods, but even from this source the actual infection may remain below the "infective threshold." For example, Rosenau states that even in the case of the extremely susceptible guinea-pig, it requires ten tubercle bacilli to produce infection.

I might even suggest as an "aside," likely to raise discussion, that it is on "sub-(infective)-threshold-infections" that we depend for our acquired increasing immunity and that therefore these subinfections should be encouraged.

In a recent combined article on cerebrospinal fever [12] I said that we might carry out local terminal disinfection because of public opinion which was insufficiently educated; actually, that is the regulation. But I felt I was wrong even then, and I think that you will agree that we ought to alter or discard methods in which we do not believe, and to educate public opinion in the right way, namely, that man is the fountain head of most of the infections to which he is heir, and that therefore the best place to apply disinfection is at the seat of infection, i.e., man himself—to his excretions and discharges.

Therefore I think we should say that our methods of disinfection or of cutting the link of disease will depend entirely on the routes of infection in that disease, and our most successful efforts will be from blows aimed at the commencement of those routes.

An interesting example of disinfection gone astray appears to me to be a recent demand by the Royal Engineers for cresol to disinfect paint brushes possibly infected with anthrax. How brushes used for ordinary painting work will infect men with anthrax it is hard to see, and the idea seems distinctly far fetched and the action unnecessary in view of the disinfecting powers of paint itself.

Having mentioned "brushes," a description of the method of disinfection of "shaving" brushes may, perhaps, not be out of place. When abroad we are frequently asked to disinfect shaving brushes.

I have had the luck to see four cases (three amongst soldiers) of anthrax actually acquired through shaving brushes.

Method 1. Wash the brush thoroughly with soap and warm water containing soda, one teaspoonful to the pint. Allow it to stand in warm water and soda for half an hour. Then stand it for half an hour in 2½ per

cent warm solution of formalin. Dry. (The temperature of the solutions should not exceed 75° F.)

Method 2. Stand in warm water and soda for half an hour; to this add cresol up to five per cent; stand one hour, repeat and dry.

Following on the logical method of trying to cut the link of infection by the disinfection of actually contaminated articles which really may be a true link of infection, a recent reprint of an article by J. G. Cumming [13] in the *Military Surgeon* on salivary-borne infections, led me to do some investigations into this method of infection through feeding utensils during the epidemic of influenza at the beginning of 1931.

The results, published in the August number of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS [14], appeared to me to be interesting. There appeared to be a definite relation between the rate of infection in certain units and even in portions of units and the efficiency or otherwise of the methods of washing up crockery and feeding utensils. The nearer the method of washing up approached disinfection or cutting of this route of spread, the smaller was the rate of infection. This was apparent in contiguous units in various parts of the area.

W. Hool [15], at Zurich, has also fairly recently published some investigations on the subject. He has come to the conclusion that pathogenic organisms may remain alive sufficiently long on eating and drinking utensils to aid in the dissemination of infections of many kinds. He discusses the resistance of organisms in saliva on these utensils to the various cleansing processes and comes to the conclusion that the practical aim should be exposure of the utensil to boiling water for from three to five minutes.

The indications are then that there is a link which can be cut by adequate disinfection of crockery and feeding utensils in canteens and dining rooms, and this link merits our attention.

The dangerous factor, particularly according to Cumming's and my own observations, appears to be the lukewarm washing water as a heavily infected go-between for the utensils of different men. The remedy is boiling water or steam.

Another link of infection with which we often have to deal is that of vegetables and fruit infected by sewage contamination during growth and by hands during distribution. You will recall the periodical cholera scare in India and the subsequent "pinking" of vegetables and fruit.

Are we right in our methods of disinfection here or should we admit that they are "eye wash" and find better methods?

For potassium permanganate the usual strength is about 1/4000, but with much dirt or organic matter present, 1/125 is stated to be the strength required for any rapid lethal effect.

Dr. Nisimura [16] in the *Gun' Idan Zassi* (*The Journal of the Japanese Army Medical Service*) gives the following conclusions.

(1) Chlorine solutions alone are practically useless.

(2) Hydrochloric acid requires a one per cent solution for two hours.

(3) Chlorine and hydrochloric acid together can be used for fruit which cannot be treated with boiling water.

(4) Boiling water is the best and safest.

I think we should bear these points in mind when next we are urged by some "know-all" officer commanding the station to disinfect *all* the fruit and vegetables in the bazaar.

As yet a further step in this logical method of disinfection or cutting the link of infection at its source, there is one last point which I should like to bring up. That point is the protection of our own personnel who are closely concerned in the examination and treatment of "droplet" and other infections.

Descriptions and instructions for disinfection usually neglect any mention of protection for the mouth and nose of personnel who are carrying out terminal disinfections, and yet such personnel apparently seldom, if ever, get infected. A fact which speaks for itself.

But the personnel I mean are those incurring the risks of *direct* droplet infection from cases in all stages, i.e., the medical officers and nursing staffs.

For such conditions as cerebrospinal fever and diphtheria in isolation hospitals masks are prescribed as a preventive measure for patients and staff. Why should not similar methods of protection be used as routine measures of prevention in the admittedly less fatal, but infinitely more infective and devastating, droplet infections of influenza and tonsillitis?

When reading an essay on Economics, I learned that every adult Briton was worth £500 to his country. It is quite gratifying to know that we are worth even that in these days. Then, if that be so, presumably medical personnel are worth even more, and therefore more worth safeguarding by any simple means such as are suggested. When epidemics commence, casualties, even though only temporary, may halve the available personnel, and cause a distinct loss of efficiency and throw a heavy strain on the remainder.

During 1931, in Aldershot, we had the actual loss of one of our number, and the temporary loss of a very high proportion of our staff. The figures are somewhat startling:—

INFLUENZA EPIDEMIC, 1931.

	Influenza	rate	for all Officers was	1·5	per cent	admissions to	hospital
	,,	,,	all R.A.M.C. Officers was	12·0	,,	,,	,,
	,,	,,	R.A.M.C. Other Ranks (Training Depots) was	2·4	,,	,,	,,
Concerned with patients and therefore exposed to infection	,,	,,	R.A.M.C. Other Ranks (Nos. 1 and 2 Coy.) was (i.e., those in contact with patients)	16·0 (over)		,,	,,
	,,	,,	Q.A.I.M.N.S. was	24·0	,,	,,	,,
	,,	,,	R.A M.C. Officers working in M.I. Rooms and Wards was (i.e., in actual contact with patients)	30·8 (over)		,,	,,

Those who were actually present will probably remember that the real *infection-rate* of the last group, *not admission-rate*, was more like 100 per cent.

I suggest that here is the point where we might apply the right type of disinfection at a very early stage and so prevent the spread of droplet infection. For all actual sick this could be done, as a routine measure, by the wearing of masks in the ordinary way. But the personnel dealing with the sick and *incipient sick* should also be protected by the wearing of masks in medical inspection rooms, reception rooms and wards.

A point worth noting in this respect is the case of R.A.M.C. officers. I found, by examining hospital orders, that, of those who were actually admitted to hospital, fifty-five per cent had been on orderly duty during the twenty-four hours prior to falling sick. The others were probably seeing sick in large numbers in the medical inspection rooms. The sickness and admission to hospital were therefore presumably due to massive infective doses during this period of duty, and, I maintain, could and should have been prevented by cutting the link of infection by the use of masks.

These masks may be plain, or they may be impregnated with chemical disinfectants, chlorine solutions and the like. I do not suggest that they should always be worn, but that at times of epidemic they should certainly be used by all personnel concerned in the examination and treatment of cases.

They are, I believe, a standing feature with the Japanese, and particularly with their army. They are said to cause little inconvenience and to interfere little with all ordinary duties.

Finally, they would be a good object lesson and, at times of shortage of personnel, might well be an important safeguard in medical inspection rooms filled with a crowd of wheezing, coughing and sneezing incipient influenza cases.

I think it will be agreed that the evidence and the figures quoted in support of the use of masks definitely indicate that we recognize these diseases as being "droplet infections" and that the route of spread is by "droplets" from the nasopharynges of infected to those of susceptible persons. In the publication on this influenza epidemic in relation to spread by eating utensils, already quoted above, I tried to show that there was a definite relationship between density of cases and poorness of cleansing methods. I am myself convinced that this may be and is actually one of the links of infection which plays a considerable part in the spread of the disease. I do not, however, mean to say that *that* route, the spoon, fork and mug, is the only or even the chief method of spread, but that it is an important link requiring consideration and the necessary disinfection.

I think that in the case of respiratory diseases we must take up two lines of disinfection in order to cut the link of infection, namely, disinfection or prevention of the droplet spread and also disinfection of the spread through eating utensils. As one of the methods in the case of the former

I suggest that we should use masks, and as the method for the latter that we should use washing methods at a sufficient temperature to disinfect or "cut the link."

In conclusion, we can, I think, agree that the whole trend of disinfection has been a change from the vague generalized methods of a time when the routes of infection were unknown, to the more exact methods of the destruction, or even prevention, of the infective agent at the very source of infection, namely, in man himself, and that improvement and progress in such methods will be attained by concentrating on and preventing the actual links of infection at their very commencement.

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THE DOCTOR'S WAR.

BY D.A.D.M.S

PART II.

(*Continued from p.* 349.)

The streets of Constantinople were now crowded with derelict Russians. It was quite common to see an elderly man wearing the badges of rank of a Russian General standing in the road offering picture post-cards to the passers-by. Everybody in the British Army did their best to help. A fund was started to provide shelter huts and soup-kitchens. Every British officer and soldier contributed something from their pay. Officers and their families took Russian girls as companions, maids, governesses, &c., or offered them some sort of work. I had a Russian cavalry colonel as a groom. He was a fine looking man but, I regret to say, a very poor groom! He had his pay, free living at the unit (as he combined a kitchen-helper with his duties as groom), and all this helped him to keep his wife in some sort of poor comfort in the city.

The condition of these poor people was inconceivable. Many of them came off the ships in just what they stood up in—no luggage, no money, nothing in the wide world but their own bodies and the clothing they wore. Just imagine if you were suddenly attacked in the streets of Dover, fled for your very life to the water-side, and just managed to scramble on board a departing ship. Next, visualize a sea voyage of several days on a small boat packed with human beings. All routine of ship life gone ; no cabins, no stewards, no dining-saloons, no bath rooms, a small bit of deck for you to sit on, or lie on if you were lucky. Whatever scraps of food you had with you were your only nourishment. You arrive at a foreign country where you are put ashore and told to look after yourself as best you can. That was the actual situation of many of these refugees. I saw them walking along a cab-rank, offering their over-coats for sale to the Turkish cab-drivers. I saw them stretched asleep, or dead, on waste bits of ground. And these people were the intelligentsia of the Russian Empire. People of substance and position, accustomed to the routine comfortable conditions of life that a reasonable income can buy. People of intelligence, education, good blood, professional men, soldiers and sailors, bankers, lawyers, priests, the whole upper middle class of a nation thrown out and turned into pariah dogs in twenty-four hours. No wonder suicide was rampant. Many could not face this appalling catastrophe and ended it in a back room by a gas stove or a revolver bullet. Those that got away with valuables in the way of jewels or furs

were the prey of every Jew or Armenian trader in the city. Every little shop was soon full of "Russian valuables for sale." I wonder what percentage of profit the shopkeepers made.

The Turk showed his Asiatic side, he just ignored this influx of destitute people; let them live or die, it was none of his business. Refugee camps were started at Prinkipo Island. My best of Registrars who had done such good work at Salonika was put in charge. Typhus broke out and, worn down with overwork, he contracted the disease and died of it. A tragic ending to a fine career, a repercussion of a revolution carried into an English family.

There were the queerest side-lines of this condition of affairs. A yacht took up an anchorage near us. Some of my officers made acquaintance with the crew, consisting of a banker, a sailor, a professor, and one hand, who got away from the Crimea in this fashion. These four men were all one class now and the yacht was their home. I don't know what other resources they had, but they were most hospitable, and frequently asked people to sail with them. I went once. We sailed at 8 a.m. and got back at 9 p.m. During all that long day our commissariat consisted of whisky and water and dry bread! The dear Russians had forgotten, or been shy of telling us, that they had no provisions laid in for the voyage. It was a long, hot day, and the sea makes one hungry. I staggered off that vessel starved with hunger and thick in the head from that beastly whisky mixed with warm water.

The Russian women were the first to get down to work. They started tea-shops, became waitresses in restaurants, shops, hotels, dance-halls, anything that gave work and some money. Many a family lived on the earnings of the female members. It was more difficult to place the men. The Turk resented any increased competition in such work as taxi or cab driving. Consequently, many of the men were unemployed—but there was no dole for them to draw. Later on many refugees made their way to Austria, France and Germany, and the city gradually became less crowded.

My friend the Prince invited me to come woodcock shooting with him. It was the strangest form of shooting I ever indulged in. He came for me in a Ford car—strange vehicle for one of royal blood—and he drove me from one old Turkish country house to another. Most of them were deserted. All had pretty extensive gardens, and each would hold perhaps three or four woodcock. We beat each garden and drove off to the next house. On the whole it was rather good fun. The Prince had a dread of assassination. The red-headed brother was with us, and in one garden we lost sight of him for a time. There was great consternation. The Prince was sure "brother" had been done in. Nothing happened, and we found brother safe and sound.

My hospital was sited in Feneraki Point, a tongue of land with a lighthouse on its tip; a picturesque little place and the view looking

towards Stamboul was magnificent. It was best at sundown. Then those far-away domes and minarets changed from white to pink and then to a smoky blue colour, standing out against a rose-pink and blue sky, finally melting down into a grey mass as the outstanding features dissolved in the gathering dusk. Feneraki was a Sunday and holiday resort. Many Turks in families would arrive in the family barouche, descend and "eat the air." The man of the party would take the lead, and the one, two, or three veiled wives would totter after him on their absurdly high-heeled shoes. But even in 1921 the Turkish women were waking up. I often saw handsome well-built young Turkish girls in becoming frocks of grey or blue silk, elegant silk stockings and smart shoes, and just a wisp of veil over nose and mouth. One young woman created much scandal. She was the daughter of a well-to-do family living in Feneraki. She had been educated in Germany and was quite emancipated, wore no veil, dressed in ordinary European clothes, and even went so far as to ride astride in breeches. She became very friendly with young British officers, too friendly her parents thought. One fine day she vanished from the scene. It was reported she had gone to visit relatives in a distant part of Anatolia.

Meanwhile the war clouds were gathering again. The Anatolian Turk was taking the field against the invading Greek. Constantinople was occupied by an Army of Occupation, but by this time it was a very small one. True we had the fleet, a formidable weapon, but it could not prevent Kemal Pasha from marching into Constantinople if the fancy seized him. No doubt the fleet could very easily shell him out again, but that would mean great destruction and loss to the large cosmopolitan city, and seriously affect business affairs. So our scanty troops in Anatolia made a sort of line of defence and we were again on a war footing. A sort of "No man's land" was mutually arranged and our patrols would meet Turkish patrols without any actual rupture taking place.

Of all places in the world I think Constantinople was the worst for British troops. It was a steady temptation all the time. Barracks were shut in, little playing accommodation, poor Turkish barracks, none of the amenities of home life to be had, and all the amusement to be got was "walking out" in the town. Two things were cheap in that city—drink and women. The drink was poisonous brandy called "mastic" and sold for about 1s. 6d. a bottle. Another potent drink was "masticho," a sort of absinthe, white stuff, that turned water a cloudy milky hue, and was powerfully intoxicating. The women were the sweepings of Europe and Asia. The city was one large brothel. Men who bore the best of characters got into trouble, men of indifferent character became hardened offenders. Lawlessness was rife. Men thought nothing of getting drunk, driving back to barracks in a cab, beating up the cabman instead of paying him, or falling on innocent passers-by and beating and robbing them. It got so bad that my own N.C.O.'s went about armed, not against the local population but against the marauding soldiery. Sometimes the local people were

too trusting. One infantry battalion was due to leave for Malta. The troops were embarking when an excited young Greek woman came to see the E.S.O. and demanded a passage for herself as her husband was going on the ship. "Who is your husband?" She gave full particulars of name and number. "You are sure you are married to him?" "But yes of a certainty, behold my married lines." The E.S.O. took the document and read that "Pte. X. had this day been awarded a third-class Certificate of Education!" The poor confiding lady had been satisfied with the important looking paper in a strange unknown language.

At times the Royal Navy livened up things by going out for fire practice. The big ships steamed out into the Sea of Marmora and did a shoot. The roar of the guns shook the windows of our house. A small local shopkeeper demanded to see me. He complained that the firing had shaken some bottles of vermouth off his shelves and two were broken. Displaying the bits of glass he requested instant "réparation" from the British Government.

On the whole I liked being on the Anatolian side. It was more countrified, you could go for walks, and we had a very pleasant lawn tennis club at Moda. The easiest way to get there was to hire a boat at Feneraki Point and row across the Bay. Tennis could be followed by a bathe from the raft anchored in Moda Bay. All very pleasant and it kept one fit. Lobsters were obtainable from the local fishermen. We soon learned the cheapest and best way to get them. Small yachts were laid up for the winter in Feneraki Bay. If a fisherman landed on the beach with lobsters in his boat the keen-eyed gendarme would descend upon him and he had to pay some sort of tax. To overcome this demand the fishermen had adopted a queer custom. They simply "tethered" the lobsters by lengths of string to the sides of the yachts. They would then row you out, pull up a lobster and offer it to you at a price. If you did not fancy that one he was plopped back into the shallow water and the next one pulled up for inspection. Having selected your lobster you wrapped it up in a bathing towel and, landing under the benevolent eye of the gendarme, strolled off to your house. Thus we defeated justice and got our lobsters cheap.

At Moda lived some of the European merchants of Constantinople. They lived in the grand way. One family owned a big slice of land along the sea-shore and lived on their estate in mediaeval grandeur. Each married member had his own house on the enclosed estate. The head of the family lived in the old central house and ruled the brood like an autocrat. They had their own sea-front, pier and yachts. The family name was so well-known throughout Turkey that it was said a signed pass from one of the family carried full protection anywhere in the land. Even the wild brigand of Anatolia would not molest anyone carrying the famous name as a passport. Their standard of life resembled that of the conquistador of South America.

I was bitten with the Persian rug desire. I paid many visits to the carpet booths of Stamboul. It is a fascinating amusement to sit and sip

good Turkish coffee, smoke a good Turkish cigarette and watch the unrolling and spreading of the rugs: Shiraz, Shirvan, Kerman, Kashan, the blues, pinks, ivories blended together to give that fascinating splash of colour in the dark little shops. After shopping we used to have tea at the upper windows of a restaurant looking out on Galata Bridge and watch the crowds passing up and down. The Rue Canabière at Marseilles is said to produce all the nations of the world promenading along its length, but it cannot hold a candle to Galata Bridge. At a guess I should say the traffic on the bridge is as great as on London Bridge. At one end of the bridge stands a row of officials with leather satchels at their sides. They touch every passenger and every vehicle for a toll. There is a tariff laid down, from motor cars to elephants, each has a price. One would think that these officials would miss a lot of people in the busy throng, but I often watched them and never saw anyone get through free.

Overlooking Galata stands the Genoese Tower, the signal station for fire alarms. A busy job in Constantinople. I should say six fires a day would be the average, and a fire *is* a fire in Stamboul. Large burnt-out areas disfigure the outlook, and the curious thing is that the Turk never seems to rebuild on a devastated site; he just moves on somewhere else and leaves the brown patch of rubbish and dirt to disfigure his city. But for pure picturesqueness I offer you the sight of the local fire brigade going out to action. You hear a tinkling of bells and a sustained even note of human voices in full cry. Down the street comes trotting the fire brigade. They move in military formation at the double. The uniform is a shirt and shorts, bare legs and feet. They carry short ladders, axes, and things like reaping hooks fixed in a long stick. They push along a sort of small fire engine—like the one still to be seen in the barracks of the British Army—a red-painted wagon with a long handle on each side. The brigade face each other across this primitive engine and pump the handles up and down. To complete the costume most of the brigade wear a red rose tucked in their black hair over the left ear. It would make a charming scene in an opera. The palace on fire, prince and princess lovers singing on the balcony while the palace burns; crowd of courtiers and peasants exhorting them in song to be brave until rescue comes. Enter fire brigade with red roses complete, singing away like anything, and the lovers are rescued on a short ladder, the while the ancient machine is pump-handled to throw a jet of water almost six feet high. It reminded me of Mr. Wemmick's fountain at Walworth, "that played to that powerful extent that it made the back of your hand quite wet." Unkind people hinted that the chief work of the fire brigade commenced when the contents of houses or shops were thrown out of windows for salvage and pickings were to be had.

It is all very well being jocular about fires, but fire was a real menace in Constantinople. Many of the houses were made of wood, and those that were not were full of massive wooden beams in the structure. A disastrous fire occurred at the British general hospital situated in the Turkish barracks.

It was an old, badly built, and badly planned building. Long corridors with rooms at the end entirely cut off from the rest of the building. Fire broke out in the middle of a cold snowy night. Half the place was gutted. Unfortunately some patients lost their lives in the sudden collapse of the wooden floors. What I wrote about above did happen here. The Nursing Sisters had to pitch their belongings out of the windows in the effort to save them. Many articles thrown out did not appear again. The cause of the fire was, I think, never proved. It may have been, probably was, accidental; but it may not have been. Armies of Occupation are not exactly popular with the people whose country they occupy, and a bit of sabotage is to be expected.

It is impossible to say anything about Constantinople without dragging in St. Sophia, the Byzantine church converted into a mosque by Muhammad II. It is wonderful and imposing. At first you are slightly puzzled by the askew appearance, produced by twisting everything inside the building to face Mecca, which, of course, the mosque does not. Of great interest are the Christian paintings showing through the coverings of crude colours painted over them. At one point by standing at an angle you can make out a thorn-crowned head of Christ quite plainly; almost as if the Man of Sorrows was there to remind us of the impossibility of concealing His message to mankind, even after 4,000 years of effort.

The colour question became acute in my hospital. One of my Indian Medical Service officers, a native of Southern India, became engaged to a Russian girl. She was one of the fairest things you could see, golden hair, blue eyes, and a complexion of milk and roses. You see girls like that in Exeter or Dulverton. He was a temporary medical officer, joined up for the war, and was soon going back to Southern India to take up private practice. Strangely enough the strongest opposition came from his own brother officers, of Indian race also, but from the North. They strongly objected to this union of European and Indian, and having voiced their opinion, ignored the whole matter. The girl was spoken to and the conditions under which she would live in India were fully explained. She silenced all opposition by a dramatic and plainly-put statement. "I have lost," she said, "all my relations in Russia. I know not if they are alive or dead. I have heard no word, I cannot return to Russia, I am an exile without money, friends, or hope. This man offers me honourable marriage. He offers me a home, food, warmth and comfort. My only other recourse is to go on the streets as a prostitute. Which would *you* choose?" As he was a Christian, a Roman Catholic, they were married at the Convent church. The French nuns were delighted to arrange everything. They never seemed to notice that there was a difference in race and colour. But the French never do.

It was now November, 1921. Quite suddenly I received orders in the official language "to proceed to England forthwith." I handed over my hospital, and sold up bits of furniture we had collected. My trusty

soldier servant organized a sale of oddments, old clothes, boots, shoes, etc., and did us very well. I had thrown in a pair of patent buttoned boots, just the thing in pre-war years, and they fetched the highest price, being very popular for Sunday wear among the Levantine lads of the village. I had to busy myself obtaining passports and *visas* to take me by the orient express through Turkey, Greece, Bulgaria, Serbia, Italy and France. My wife and I embarked on the orient express and left for England. A most interesting journey. Particularly in 1921, when things in the Balkans were still very warlike-looking. At each frontier we took on an armed guard of the country. A stroll down the corridor every few hours meant tripping over the feet of soldiers in different uniforms. It was quite a game to go out and see in what country you happened to be. Also at each frontier we took on a dining saloon. Consequently in five days we sampled many different ways of cooking and, believe me, the Turkish was the best of the lot. We were held up for one whole night in Serbia, due to heavy snow falls. The track was so indifferent and unsafe, after all these years of war in the Balkans, that the driver refused to proceed until he could see the rails. We went very slowly and were telephoned through from station to station to report on the condition of the line. The run through Italy and France was uneventful, and so via Calais to Dover. We had with us in the train—there were only about a dozen first-class passengers—a young British officer who had been a prisoner of war in Anatolia since the fall of Kut, and for some reason his release had been long delayed, and then he had been kept at Constantinople. It was good to see his delight and excitement at getting home after all those weary years.

Editorial.

REPORT OF THE MEDICAL RESEARCH COUNCIL FOR THE YEAR 1930-1931.

In the Introduction to the Report the Council state that few years have brought a better harvest of fruitful and encouraging results than this, the seventeenth year of their work.

A large part of the Council's funds has been expended on nutritional research. Early in the year, a group of investigators, working under the leadership of Dr. Bourdillon, succeeded in obtaining from the products gained by irradiation of ergosterol a crystalline compound with very high vitamin D activity, which they named provisionally 'Calciferol,' as they foresaw that it might contain a proportion of inactive material. Professor Windaus also obtained from mixed irradiation products a crystalline substance which he called 'Vitamin D_1.' This was very similar to calciferol as regards antirachitic properties, but differed in its effect on polarized light.

Dr. Callow, working at the National Institute on the purification of irradiation products, found that two esters obtained from the distilled calciferol had crystals differing in shape and colour, so that they were separated without difficulty. One of the esters yielded a sterol having about twice the antirachitic activity of the most potent substance hitherto obtained, and to this the name calciferol has now been applied. The other ester gave an inactive sterol, which had been formed from calciferol by the heat during distillation ; this was accordingly called pyro-calciferol.

Professor Windaus was then able, by employing Dr. Callow's method, to separate his vitamin 'D_1' into vitamin 'D_2' (calciferol) and another sterol, presumably inactive. The evidence now available seems to show that the substance calciferol (or vitamin D_2) is the true antirachitic vitamin in practically pure form. The crystalline calciferol is stated to have astonishingly intense biological activity. Weight for weight it has 400,000 times the value of a good sample of cod-liver oil in preventing or curing rickets.

Having now accurate knowledge of vitamin D in terms of its chemical structure and physical properties, it will be possible to measure the vitamin D activity of any food by a fixed standard. The present standard is a preparation of irradiated ergosterol which can be kept stable under right conditions. One unit of vitamin D is defined as equivalent to one milligram of this solution. By international agreement, this standard is to be maintained at the National Institute for world-wide reference, and it was agreed that if vitamin D should be isolated in pure crystalline form,

the international unit should be re-defined in terms of the pure substance. The isolation of calciferol seems to have fulfilled this indication, and one milligram of it is equivalent to about 40,000 international units of the present standard.

The Council state there is good reason to believe that the great majority of the population living under urban conditions are living very near the minimum of adequate vitamin D supply. This applies especially to the young and actively growing. Work in the National Institute has led to the large-scale artificial production of vitamin D in this country and has brought about the possibility of a great national saving in health and money.

Progress in the study of virus diseases has been maintained and one of the main parts of the Council's policy "has been to aim at the improvement of the technical means of handling, seeing and measuring these extremely minute particulate agents of disease." For some years Dr. Elford has been engaged on the problem of making filters of which the pores will have both a uniform and measurable size and be of sufficient strength for the work of the bacteriologist. In the past year he has made a new series of graded collodion membranes (called gradocal membranes) which meet these requirements. They have been in use for some time at the National Institute. Dr. Elford has shown that the virus of *infectious ectromelia* in an infective organ extract will be passed freely by one and completely stopped by another membrane of his series, proving that the virus is composed of particles which are uniform in size within narrow limits. He has calculated that the virus particles have a diameter not less than 0·1 μ or more than 1·5 μ. Mr. Barnard's new microscopical methods have revealed in similar extracts minute bodies of a uniform diameter of about 0·13 to 0·14 μ. The "inclusion bodies," which appear in epidermal cells infected with this as with many other viruses, are closely packed with minute bodies indistinguishable from those found in the infective extracts made from other organs. From these observations and those of other workers who have been able to use only ordinary direct microscopic examination for the virus particles, the Council consider there is no reasonable doubt that the virus consists of definite, self-producing organisms, and that these differ from bacteria, visible by ordinary microscopical methods, chiefly in being so minute that their diameter is much less than the wave-length of visible light rays.

Mr. Galloway has continued his work on foot and mouth disease. Three types of virus are now known, distinguishable by the fact that recovery from an attack of any one of them leaves the animal immune to renewed infection by that one, but not immune to the others. When tested by filtration through graded membranes, the virus particles in all three types have the minute diameter of about 0·008 to 0·012 μ. It has been questioned whether particles so minute can be regarded as living organisms. They

are certainly far below the range of any method of microscopic examination which can be foreseen.

Dr. Elford and Mr. Galloway compared a bacteriophage for the colon bacillus with the virus of foot-and-mouth disease. They found that it was retained by a membrane which allowed the virus of foot-and-mouth disease to pass completely. They estimated the diameter of its particles to be 0·02 to 0·08 μ.

Using a suitable preparation of vaccinia virus, Dr. Andrewes and Dr. Elford have found that its units appear to have a diameter of 0·125 to 0·175 μ. It seems probable, therefore, that the vaccinia virus will be proved to consist, like that of ectromelia, of sub-microscopic organisms.

Dr. Perdrau has continued his investigations of the viruses affecting the nervous system characterized by the loss of the myelin sheaths in tracts of nerve fibres. But neither the virus of the preliminary infection nor any other, previously latent, which the infection might have aroused into activity, has yet been discovered in the brain. There is a possibility that demyelinating diseases are not due to infection of the nervous system with a virus, but to conditions of toxæmia and malnutrition associated with the antecedent infection. Professor Mellanby has observed at Sheffield similar conditions in dogs deprived of vitamin A and subjected to chronic poisoning with ergot.

The final stages of the work on canine distemper are being carried out at the Farm Laboratories of the National Institute. The vaccine-virus method for the immunization of dogs against distemper is now firmly established.

The difficulties met with in the commercial manufacture of the preparations have been overcome and the methods improved. These include the preparation of a dried virus which can be stored and transported without loss of potency and the introduction of a test for standardizing the vaccine.

Observations on twenty-three packs of hounds repeatedly exposed to infection have shown that the incidence of distemper among 650 inoculated hounds was only 1·4 per cent and the death-rate 0·3 per cent. Without inoculation, the incidence of distemper among young foxhounds in this country is nearly 100 per cent, and the death-rate is frequently 50 per cent, and may exceed 75 per cent.

Dr. Laidlaw and Mr. Dunkin have been occupied in developing a second method of immunization based upon the use of anti-distemper serum prepared by the hyper-immunization of a dog. The serum resembles the vaccine in that it produces a temporary state of resistance which can be converted into a lasting immunity by the injection of fresh virus. There is an important practical advantage in that the virus and serum can be injected at different sites at one sitting instead of after an interval of a week. The serum can also be used to protect a dog already exposed to infection but still in the incubation stage; it is also of value in the treatment of declared cases of distemper. This anti-serum is now being issued commercially by the Wellcome Laboratories.

Professors Topley and Greenwood have continued their studies in experimental epidemiology. The results they have obtained seem to indicate that the processes of herd immunization in bacterial and virus infections may be fundamentally different. In the case of mouse-typhoid immunization will, from the herd point of view, protect a group so that it can withstand a period of acute exposure to risk better than untreated animals. But if conditions of severe exposure to risk are maintained, the general effect on the herd will be relatively trivial. On the other hand, in the case of virus disease, it is probable that if admission to a herd in which the disease had gained a footing were restricted to immunized animals, the herd mortality might be completely arrested.

The Council state that it has often been made a reproach to the medical world that no effective control has been gained over the plague of the "common cold" that inflicts such a burden of inconvenience, with many added risks of death, and brings heavy annual expense to the country through loss of time and work.

There has been reason to believe that the infective agent of colds is primarily a virus which may open the way to the secondary invasion of various kinds of bacteria.

The chief bar to progress has been the absence of a satisfactory method of investigation, as none of the ordinary laboratory animals appear to be susceptible to the causal agent of this form of illness in man.

Fortunately, a large fund has been made available by a business organization in the United States, and Dr. Dochez, of New York, and his colleagues have been able to use chimpanzees for experiment, under conditions of rigid quarantine, unceasing attendance and control. It was found possible to transmit colds to these apes in nearly half the attempts by the use of material from persons in the stages of catarrh, and filtered so as to exclude bacteria. Clear evidence was thus obtained that the infective agent belonged to the virus group. The catarrhal virus could be cultivated outside the body in the living cells from a chicken embryo, and could be passed through a series of subcultures.

In the chimpanzees, just like men, only a brief immunity followed infection by the catarrhal virus. The shortness of this immunity diminishes the prospect of any rapid attainment of the means of practical control.

Some very interesting work is being carried out on the separation and chemical characters of the constituents of bacteria connected with their immunity reactions.

Studies of the Salmonella group of bacteria have shown that some of the constituents of the bacillary bodies are common to the whole group, while others, by virtue of their chemical structure, are specific for one or two members of it, as tested by their reactions with immune sera.

Mr. Bruce White has made an intensive study of the Salmonella group of organisms for some years, and has shown that the type of an organism of

this genus found in freshly isolated cultures, in which it retains its pathogenicity and grows in "smooth" colonies, has a carbohydrate constituent of the type concerned in the specific reaction to agglutinating sera. The type growing in "rough" colonies, on the other hand, which arises as a variant in artificial culture, has lost this specific carbohydrate and therewith most or all its disease-producing qualities. He had supposed that the rough colonies did not contain any characteristic carbohydrate, but by further work he has now prepared a carbohydrate "haptene" which gives an identical reaction with immune sera from whatever member of the genus it has been prepared. For instance, if it has been obtained from a rough strain of the typhoid bacillus it will produce a precipitate with the serum of a rabbit immunized against the rough strain of any Salmonella. In some cases, however, when a strain has been kept in artificial culture for some years, Mr. Bruce White has found certain rough colonies which appear to be free from the carbohydrate component common to the genus, as well as that characterizing the separate species. This degenerate form Mr. Bruce White terms the "ρ-form."

From these observations there appears to be distinct evidence that certain of the agglutinin reactions are connected with the carbohydrate haptenes, since these in solution, when mixed with sera agglutinating the corresponding organisms, neutralize the action on the bacterial bodies.

Mr. Bruce White has made further study of the antigenic proteins of the Salmonella group, and has obtained a new protein, called the "Q" protein, which is common to all the organisms of the genus and behaves as a complete antigen, but the anti-serum prepared by its use agglutinates most strongly the ρ-forms.

It seems probable that the intricate differences and relations among the organisms of the Salmonella group, as regards their reactions with immune sera, will soon be stated in chemical terms instead of, as now, by a purely empirical nomenclature.

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Dr. Gough has also been examining the proteins derived from tubercle bacilli and has recovered two distinct forms: one of these, from its phosphorus content, is likely to be a nucleo-protein, and the other may be a derivative from it. Both, apparently, have the characteristic tuberculin activity in the intradermal test used for the detection of tuberculous infection in human beings or cattle.

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At the National Institute for Medical Research many investigations have been carried out in connection with the standards for important

remedies which can be tested and standardized only by biological means. Dr. Dale had accepted for the Institute the task of organizing international investigations of the standard for gas gangrene (perfringens) antitoxin, and of the diagnostic test dose of diphtheria toxin (Schick test). The Institute also co-operated in the international trials of preparations suitable as standards for vitamins A, B and D, with a view to their consideration by the Conference on Vitamins.

Dr. Hartley and Mr. Bruce White had already prepared in dry stable form a quantity of an antitoxin for the toxin of *B. welchii* (perfringens) and had accurately determined its value in terms of the U.S.A. unit. For the international trial they prepared a supply of the corresponding toxin in dry form. The results of the international tests were very satisfactory, and the Conference recommended the international adoption of a standard and unit for this serum based on those already used in the U.S.A. A quantity of the dried standard antitoxin prepared by the Institute will be held and distributed for international use by the Serum Institute, Copenhagen.

Two samples of diphtheria toxin for the Schick test chosen by Dr. Hartley, with the valuable co-operation of the Wellcome Laboratories, were tested in eight countries. The results, analysed by Dr. Hartley, enabled the Conference to recommend, for international use, a definition embodying the tests already officially prescribed for this country under the Therapeutic Substances Act.

Before the Conference on Vitamins the Institute distributed three preparations to fourteen investigators in seven countries for trial as to their suitability as standards. These were: (1) The oily solution of irradiated ergosterol, already in use as a provisional standard for vitamin D; (2) a preparation of carotene, for trial as a standard for vitamin A; and (3) a dried adsorption product on fuller's earth of the active constituent of rice polishings, supplied by Professor Jansen, for trial as a standard for vitamin B_1.

The International Conference unanimously decided to recommend the adoption of preparations similar to those submitted for trial as international standards for the respective vitamins, and the definition, in terms of each standard, of an international unit of the activity of the corresponding vitamin. They further recommended that the National Institute for Medical Research should act on behalf of the League of Nations Health Organization as the central laboratory for the preparation of two and the preservation of all three standard preparations and for their distribution to the countries requiring them.

The insulin standard prepared at the Institute in 1924, which still serves as the international standard on which the unit is based in all countries, is stated to be relatively impure. Highly purified insulin can now be produced in manufacture, and it seems desirable to replace the standard insulin by a new standard made from insulin of the high purity now attainable.

The question has been raised whether insulin solutions without artificial disinfectant are capable of acting as culture media and so permitting the growth of bacteria. Dr. Hartley has found that the acidity prescribed for such solutions is by itself lethal for streptococci, but, when neutralized or made slightly alkaline, as it may be during the withdrawal of repeated doses in practical use unless precautions are taken, the insulin becomes a favourable culture medium for organisms which may have been accidentally introduced.

The Council state that it has long been suspected that the supposed disease "status lymphaticus" has no real existence. In 1926 the Council, in conjunction with the Pathological Society of Great Britain and Ireland, organized a collective investigation of "status lymphaticus." The main objects of the investigation were, first, to establish the standards of weight for age, and proportion for body-weight, of the normal thymus at all ages, and, second, to investigate closely the cause of death in persons dying suddenly from trivial causes, where the only apparent abnormality was the presence of a large thymus. An analysis of the data collected has been made by Dr. Mathew Young and Professor Turnbull. The inquiry has definitely established the average weights of the normal thymus for the several ages from one year upwards and established the mean percentage proportions of the thymic weight to the body-weight for the different age-groups. The results agree with those collected by Professor Turnbull and published by Greenwood and Woods in 1927. They provide "no evidence that the so-called '*status thymico-lymphaticus*' has any existence as a pathological entity."

Clinical and other Notes.

NOTES ON A DEMONSTRATION BY THE CROOKES LABORATORIES.

By C. S.

On March 3, 1932, there was a very interesting and instructive demonstration at the Crookes Laboratories.

The demonstration was given by the Chief Chemist to the Laboratories, who began by showing a ready method of applying the tannic-acid treatment for burns.

The demonstrator pointed out that difficulty in applying this very valuable treatment arises owing to the fact that the solutions must be freshly prepared, otherwise oxidation very rapidly occurs when they are exposed to the air, and gallic acid is formed which is of no value in the treatment of burns. As burns always occur as emergencies, and the solution must be applied early to produce the best results, Messrs. Crookes have overcome this difficulty by putting the solution up in ampoules from which air has been excluded, and in consequence it remains fresh and ready for use at a moment's notice, and should on this account prove very valuable in out-patient departments, in mines, and in industries where the workers are liable to burns at their work. In the Army it is likely to be of great service as an addition to the field equipment.

As attention had been drawn by some surgeons to the fact that septic processes sometimes followed the application of tannic acid with a copious formation of pus under the coagulum, the firm have been experimenting with the idea of combining with the tannic acid some antiseptic which would help to inhibit the growth of organisms under the coagulum.

Most of the ordinary antiseptics proved to be incompatible with tannic acid, but it was found that 1 in 50,000 acriflavine could be added to the tannic acid without causing any precipitate or alteration in the chemical qualities of the solution.

In consequence, Messrs. Crookes now make up ampoules containing 2½ per cent tannic acid with 1 in 50,000 acriflavine. While clinical proof of the value of acriflavine in this mixture is still lacking, it is well worth a trial, and as acriflavine is one of the antiseptics which does not lose its power in the presence of the body fluids, it is reasonable to infer that its addition to tannic acid as an application to burns will prove to be an improvement over tannic acid alone.

The first-aid outfit as put up by the firm is neat and compact. The

solution is contained in an ampoule, and a special spray is supplied with an adaptor which fits over the ampoule. The rubber tube of the spray is introduced into the ampoule, and the adaptor secured to fit tightly on the top. The whole of the solution can then be sprayed in a few minutes over the burned area.

To show that the ampoule contains sufficient for even very large burns, six square feet of paper marked into one-foot squares were sprayed with a coloured solution contained in one ampoule and five square feet were completely covered, which should meet the requirements of even very extensive burns.

The next demonstration was concerned with the preparation and safe usage of various solutions for intravenous infusions. Glucose, gum, saline, solutions of bicarbonate of soda, and normal saline, can all be supplied in the special form recommended by the firm.

The clinical difficulties in preparing sterile solutions and the methods of overcoming them were explained, and the special difficulty in dealing with bicarbonate of soda owing to the giving off of CO_2 on heating.

The solutions are put up in large ampoules fitted in a special container so that the ampoule can be hung on the wall when the operation of infusion is being carried out. In use the whole ampoule is first immersed in a bucket of water at 140° F. for two minutes; this gives a solution for infusion at a temperature of 99° F. When withdrawn from the bath the container and ampoule are laid horizontally, and with the file provided the tube is cut across at the lower end and the cannula tube connected. A clip is put on the tube. An air-filter tube is supplied which is attached to the upper end of the tube after the glass tube at that end has been filed and broken off.

The methods of use were further illustrated by a cinematograph film of an actual infusion. The ease and quickness of the method were well demonstrated, and the whole procedure until the solution had begun to run into the vein of the patient occupied four minutes.

Surgeons who have had to have these various solutions made up for use in the operating room will realize the difficulties often met with; these difficulties are much enhanced when the infusion is required in a field ambulance dressing station or a casualty clearing station. In private practice where efficient assistance is not available, this method should also be most valuable.

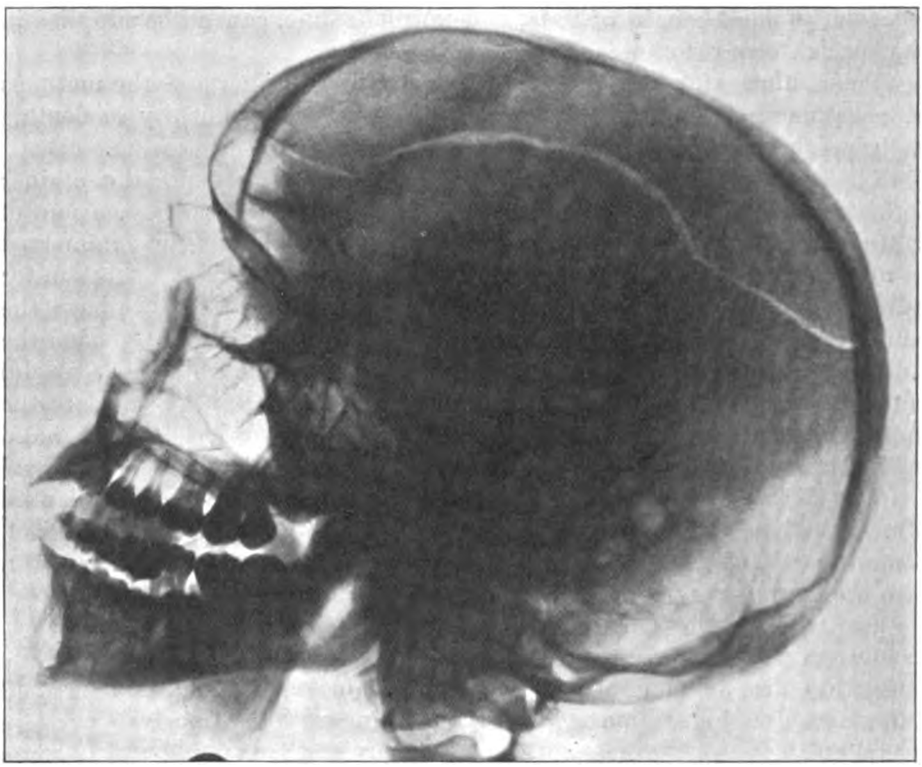
A further cinematograph film showing the behaviour of a beam of light when passed through solutions of colloids was also very interesting and instructive.

COMPLETE FISSURED FRACTURE OF SKULL.

By Captain K. B. GORE,
Indian Medical Service.

Gunner M. K., aged 29, was admitted to hospital on July 22, 1931, with an injury to the head from a hockey stick.

On admission the patient was in a drowsy condition but understood what was said to him. He could not speak, but could put out his tongue when asked to do so. There was a swelling over the left side of head and face, particularly over the zygoma. The left eye was completely closed and



discoloured. There was slight bleeding from the nose although there was no visible injury to it. No discharge from the ear was noticed. The motor functions were normal and reflexes, superficial, deep and organic, were present. The heart beat was slow ; pulse slow, regular and full.

He was left at rest in bed, an ice-bag was applied to the head and a hot-water bottle to the body.

On July 24 the patient looked bright and was completely conscious. The left eye could be opened and showed subconjunctival hæmorrhage. The

left pupil was contracted and did not react to light. Aphasia was complete.

X-ray examination on July 27 showed a fissured fracture extending almost completely around the vault, passing through frontal, parietal, and occipital bones. The swelling over the left side of head was much reduced. When the patient was asked to put out his tongue he could do so, but it was noticed that at the commencement of the act the tongue deviated to the left, later assuming the normal position.

Ten days later the general condition had much improved. There was definite pain over the left temporal region.

The patient was put on potassium iodide, ten grains, t.d.s. On August 7 swelling over the head and face was not noticeable. The left pupil was slightly contracted and reacted to light. He could move his tongue and emitted some indefinite sounds. A week later both pupils were equal and reacted to light and accommodation. On the 25th he was able to articulate a few disconnected words, but only with difficulty and very slowly.

By September 10 he had regained the power of speech, but articulation was slurred during conversation. He complained of pain over the left temporal region on deep pressure. X-ray showed bony union.

My thanks are due to Lieutenant-Colonel H. P. Hart, M.C., R.A.M.C., for allowing me to publish this note.

Travel.

BY RAIL AND ROAD IN INDIA.

By Major L. B. CLARKE,
Royal Army Medical Corps.

(*Continued from p.* 385.)

III.—The North.

Official tours were made in the month of November to Jhelum, Abbottabad, and Campbellpore, and at Christmas time a three weeks' leave enabled one to visit Lahore, Delhi and Agra.

The run of 175 miles to Lahore was done in five hours, and here one was entertained by friends for four days. Lahore, the capital of the Punjab, is a cheerful and pleasing town, with much going on. It is well laid out, with many European shops, fine avenues of stately and shady trees, public parks and gardens and a Gymkhana Club, which is housed in perhaps the finest building of its kind in the East. Two durbar halls belonging to the Government are used, one a large ball-room with ceremonial staircase, beneath which a Club band containing an exiled Russian prince discourses

the usual dance music, and the other a distinguished teak-panelled reading room with oil paintings of all the Governors of the Punjab. This is the centre of the social life of Lahore with its big European population.

In handsome new buildings in the Mall are the offices of the *Civil and Military Gazette,* and in one of the rooms is preserved a table at which Rudyard Kipling worked in his earlier days when he was on the staff of this paper. The "*C. and M.*," an old-established English journal, is the principal daily paper and the chief source of news throughout the whole of northern India.

At one end of the Mall, in the middle of the road opposite the Museum, stands the "Zam zamma," or "Kim's gun," still a favourite hobby-horse

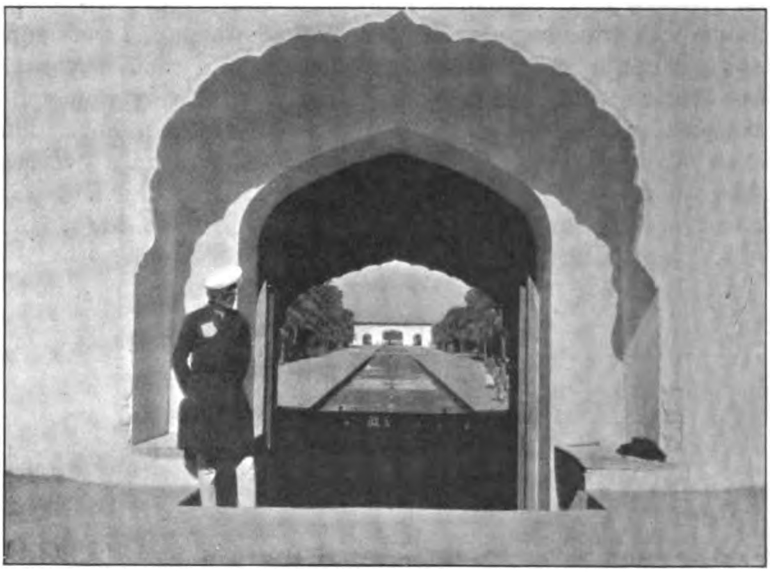


FIG. 1.—Shalimar Gardens, Lahore.

with the local youth, and on any fine day crowds of small ill-kempt children can be seen climbing over it just as in Kipling's time.

At Lahore are two old Moghul masterpieces, the stately mosque at Shahdara, which contains the tomb of the Emperor Jehangir, and the ornate Shalimar Gardens, with fountains and waterways, which should not be confused with the better-known garden of the same name in Kashmir.

There were many social events taking place in the week before Christmas, and one of the most interesting was the inaugural meeting of the Punjab Flying Club. In a wide open dusty field a few miles out of the town had collected vast crowds from all over northern India to see their first view of flying. It must be admitted, however, that the people were of more interest than the actual flying. There were great numbers

of wealthy Indians, with their ladies dressed in wonderful saris of the most gorgeous and striking silks, and here and there a native prince, with his retinue, or a border chief, bristling with moustaches and daggers, from the far-off confines of some frontier State.

The weather was bright and sunny, but at night it was extremely cold and one was glad of all one's warm clothes.

The journey southwards was continued via Ferozepore to Ludhiana (128 miles), noted for the unremitting zeal of its numerous manufacturers, whose advertisements of Sam Browne belts, regimental badges and buttons are often the chief feature of an otherwise depressing mail. Here a new dak bungalow serves as a model of what such an establishment should be in India. Next morning it was discovered that the fan belt of the car had broken, and as it was Christmas Day the chances of early repair or replacement appeared remote, but in a short time the driver returned from the bazaar with a new one, which was soon fitted on.

On the run to Amballa (75 miles) the first and only puncture occurred and a big nail soon deflated a new Dunlop tyre. The fitting on of a spare wheel took little time and the journey was resumed. The last few miles into Amballa were noteworthy for the dense white clouds of dust raised by a vehicle ahead and, as visibility was *nil*, it was impossible to overtake the car.

A night in Amballa, and the next day the journey was continued to Delhi (123 miles).

At the very start, however, a long delay occurred through the gate of the level crossing being closed. In about ten minutes' time a goods train came into sight, then shunted backwards and forwards for about half an hour, the train never actually clearing the crossing, and finally, after its welcome disappearance, a further tedious wait took place because a passenger train was expected. At last this came through and, after three-quarters of an hour's delay, one was able to proceed. It is a curious thing in India that when one travels by train one is frequently held up because the road crossing is open, and when one travels by road one is similarly held up because the railway crossing is closed. It appears to be a favourite game throughout the country, and one is left wondering which side scores the most in the end. From one's personal experience it would appear to end in a draw. Anyhow, the man in charge of the gate refused to produce his complaint book and was accordingly reported to his headquarters at Lahore.

The Grand Trunk Road continues straight and dead flat for mile after mile. It is, however, full of life and incident, numerous animals being led or driven by their owners, tall swaying camels, bile carts creaking their slow and weary way, strange "Delhi" carts of high and tottering design and now and then a richly ornamented camel-drawn vehicle whose gorgeous wrappings and coverings denote the journeying of some Moslem lady in the strictest purdah.

Green paroquets flit constantly across the road, great herds of monkeys disport themselves in the neighbouring trees, and now and then a complete stop has to be made to allow the monkeys to clear off the road. These animals are regarded as sacred and no one ever interferes with them. The result is that they are very tame and almost cheeky. A sudden pull up was made at one place to avoid running over a minute baby monkey still left playing in the middle of the road when its elders had sought security in their adjacent arboreal homes.

The vegetation becomes thicker, the trees more tropical, and from now onwards great abundance of palms indicates a warmer climate.

The northern approach to Delhi takes one first into the Old Cantonment. Beyond this is the old walled city, famous in history; next comes the extensive New City, now the seat of the Government of India, and further on the new Military Cantonment. There are thus four Delhis in existence at the present time. How many there have been in the past even a close study of the history books does not reveal, for scattered all over this vast area are the remains of numerous extinct civilizations. The landscape is dotted as far as the eye can see with ancient tombs, some of fine and artistic design like that of the Emperor Humayun, others merely the crumbling stones of some obscure sepulchre.

The Old Cantonment contains the recently evacuated Viceroy's House, like the show palace of some temporary Wembley, the site of the Coronation Durbar of 1911 still marked by dais and obelisk, Nicholson's grave and monument, many hotels, public buildings and gardens. High on the Ridge stands the Mutiny Tower, from which the women and children looked in vain for the relieving troops throughout the long hot Sunday afternoon of May 10, 1857.

The old walled city is entered through the Kashmir Gate and one can still see the damage in the walls which was caused by the gallant efforts of the Army to penetrate the stronghold of the mutineers. Within the walls is the modern city, packed tight with congested native dwellings, bazaars and shops. To the east of this area is a wide open space, through which the Grand Trunk Road proceeds, and to the other side is the old Fort. Leading up to it and emerging from the densest of Delhi's congested bazaars, is the wide Chandni Chauk, where crowds of girls carrying the Congress flag had to be negotiated with care and tact.

The old Fort with its soft red sandstone, mellow in the evening light, stands sentry over one of India's most important cities, and contains an ancient palace, the workmanship of which is unique and unexcelled. Numerous pavilions and halls overlooking the placid waters of the Jumna date from Moghul times, and here, in a splendour unequalled in history, reigned the greatest of India's rulers. Built in our Stuart period, the various pavilions, thanks to the kindness of the climate and to Lord Curzon's renovations, stand out fresh and unspoilt in all their pristine glory. Ornamental streams of water traverse the pavilions, the marble conduit in which

they run being decorated with inlaid curves of gold and silver to represent the effect of fishes. The walls of each building to the height of a man's head, or higher, are decorated with an inlay of semi-precious stones let into the white marble panels, and here mother-of-pearl, blood-stone, cornelian, jasper, jade, malachite and lapis lazuli, worked into designs of lotus, poppy and jasmine, stand out in the same freshness and purity as on the day when they first pleased the eye of Emperor or courtesan.

This inlay of semi-precious stones in white marble, which is of Italian origin, is called *pietra dura*, and is the chief decorative feature of all the old Moghul buildings in this part of the country. And so one can understand how travellers in olden times returned to England with their tales of Moghul magnificence, for in no other part of the world can be seen such concentrated splendour.

The new Imperial City is a masterpiece of design and dignity. Its long wide processional avenues connect one great building of State with another. The Secretariat, with rising roadway separating its two balanced buildings, the Viceroy's House beyond, and the Legislative Assembly to one side, are all in imposing positions and stand out in dramatic stateliness. Ornamental fountains of polished dark-red stone and numerous balustraded terraces offset the main structures, which are of soft red sandstone below and grey stone above, the colour scheme in its mellow tones harmonizing with the landscape and with the suffused light of the setting sun. In a few years the appearance of these buildings will be in perfect keeping with their environment.

The Viceroy's House is stately and dignified, and appears to be of such dimensions that any of our European Royal Palaces could be comfortably dropped inside and lost. In front stands a great pillar surmounted by the Star of India in crystal, which, with the reflecting surfaces of its many facets, is visible by night as well as by day.

The Legislative Assembly, an enormous circular pillared structure in the Greek style, familiarly known as "the gasometer," contains three chambers, the Council of State, the Princes' Chamber, and the Assembly itself. In the latter one is shown the seats of the various officials and members, and to one side can be seen the place where a bomb was thrown in the presence of the Simon Commission.

At the far end of the mile long processional way leading from the Viceroy's House and the Secretariat is a great arch resembling the Arc de Triomphe, India's memorial to those who fell in the war. Their many names are inscribed in gold lettering on the walls, and above, a flame of remembrance is to burn perpetually.

The houses of the ruling princes, each a palace in itself, the Commander-in-Chief's house, the residences of the officials, are all in keeping with the central Government buildings and form a great modern city of spaciousness, comfort and convenience.

A few miles beyond the Imperial City stands the new military canton-

ment, and here again modern up-to-date buildings indicate, as in Rangoon, what can be done for the comfort of the troops. The new red brick church, however, is remarkably ugly, and might be mistaken for a mill or warehouse, and has an echo which should do much to curb the loquacity of its future preachers.

Before leaving Delhi a visit was paid to the Kutub Minar, twelve miles out. This is an ancient red sandstone tower of victory, 240 feet in height, which dominates the country for miles around. It is ugly, but picturesque. Close at hand are the remains of a large mosque, and to one side the Iron Pillar, another commemorative structure, with a history going back into the obscurity of the past. It is constructed of solid iron of apparently a rustless variety. Its origin and manufacture, probably a lost art, are wrapped in mystery.

The run to Agra (131 miles) was uneventful. Near the town the tomb of the Great Akbar is passed, a big mausoleum standing back from the road in extensive and well-kept grounds. Agra is a difficult town to approach, and most people who do not know the way get lost in its numerous and winding bazaars, and on the present occasion a very narrow tortuous street was entered, where it was impossible to turn the car, and one had to drive backwards for some distance to the discomfort of its many squatting residents, scavenging pi dogs and scurrying chickens.

The chief thing to see at Agra is of course the Taj Mahal, and many visits should be made by different lights, for the effect is different with each. One of the greatest sights in the world, it is a superb masterpiece of delicate design. One of the few show places in India which do not evoke disappointment, it is in a perfect state of preservation, and both the building itself and the spacious ornamental gardens which surround it are evidence of the continuous care it receives from its responsible guardians.

Built as a mausoleum by the Emperor Shah Jehan, for the tomb of his beautiful wife, Mumtaz Mahal, the great domed mosque looks as though it had been but recently completed, and yet it is older than St. Paul's.

It is constructed throughout of pure white marble, and the extensive dais on which it stands, as well as the four graceful minarets at the corners, are of the same material, all gleaming white in the brilliant sunshine of a cloudless Indian sky. By night, with the full moon, it becomes a fantasy of dreamlike beauty, and the picture seen through the arch of the main gateway is the memory of a life-time.

Flanking its two sides are great red sandstone structures intended to form a contrast to the pure white of the Taj itself. One is a mosque, and the other exactly resembling it is called the "jawab" or answer. Beyond lies the Jumna River, placid and muddy, the home of countless tortoises.

Closer inspection of the mosque reveals the intricate designs of *pietra dura*. High above are texts from the Koran, inlaid in black slate against the pure white of the walls. Inside the Cenatoph Chamber two tombs are seen, that of Mumtaz Mahal in the centre, and, to one side, that of Shah

Jehan, and surrounding them is an octagonal trellis-work screen of white marble, originally in pure gold, but later removed for fear of theft. The actual tombs are in a basement below, and in a darkened chamber can be dimly perceived two tombs, similar in size, shape and position to those above.

The walls to a great height are decorated with *pietra dura*; in the centre is an ornate hanging Cairene lamp, presented by Lord Curzon. Even in the daytime the light effect of this chamber is very subdued; it seems haunted by the memories of the past, and one is afraid to speak, till suddenly, booming out into the lofty recesses of the inner dome and resounding from wall to wall, is heard the voice of the attendant raised in demonstration of the remarkable echo, and in the pious hope that his efforts may be rewarded.

The Taj Mahal took twenty-two years to complete; 20,000 men were employed, and the cost was estimated at between one and two millions sterling; truly an adequate memorial to a beloved wife and a beautiful queen. It may be added that she died giving birth to her fourteenth child.

The Fort at Agra is similar to that at Delhi, and also contains a magnificent royal palace of *pietra dura*; marble water-ways, ornamental fountains, and, in one of the pavilions overlooking the Jumna, with his gaze fixed on the far-off Taj across the water, Shah Jehan breathed his last.

About 20 miles beyond Agra is the celebrated deserted city of Fatehpur Sikri, built by a Moghul Emperor to last for an age, and evacuated in a life time. Scarcity of good water is said to have accounted for the move of his capital back to Agra in only a few short years. On a low, wide eminence, overlooking the brown and dusty regions of a parched plain, is an old walled city. Within, great public buildings are found, complete and intact. The royal residence, the mosque, the treasury, the audience chamber, the seraglio, are all in a perfect state of preservation. Even the stables, where elephants and horses were housed, still contain the metal rings to which they were tethered, and the state in which they lived bears favourable comparison with that of many a wealthy Indian of the present time. One can well picture the grandeur, brilliance and ceremony of the day, the life of ease and indolence of the nobles, and the misery and squalor of the lower orders. Times pass and customs change, but Fatehpur Sikri remains an epitome of a bygone age.

At the hotel at Agra, vendors of numerous curios squat outside the building, ready to sell their wares. In addition to the ubiquitous carpets and silks, all ready for the hustling American giving India the "once over," one finds the local craft: small *pietra dura* tablets of exquisite design, copied from the panels of the old buildings, and soapstone models of the Taj in all sizes, varying from one you can put in your pocket to enormous ones illuminated by electric light, which would require a bile cart to remove.

Here, in the hotel garden, came from one side a snake charmer, and

from the other a bear wallah, a picturesque scene for a camera. A snap was taken, but as both snakes and bear desired to occupy the centre of the stage simultaneously, the former raising their hoods and hissing, and the latter advancing with outstretched arms and growling, their owners promptly removed them, and after glaring hard at one another for some moments, took them to a safe distance, and so communal disturbances in both human and animal affairs were thus averted.

The return journey to Rawalpindi was done in five days, one night being spent at Delhi, another at Amballa, and a couple of nights at Lahore.

The remainder of the cold weather passed very quickly, and by the end of March one was again in Lahore for an examination. A fortnight was spent here, and if Lahore had been thought too cold at Christmas, it was now quite the opposite, and the days and nights were unpleasantly hot and stuffy.

The return journey northwards was made direct to one's station in the Murree Hills. Lahore was left at 7.55, and the Pindi Mess reached at 12.55 in time for lunch. The 174·8 miles was done in four hours forty-eight minutes, and a twelve-minute stop at Jhelum was made for petrol. The average time for the Jhelum-Pindi part was 38·4 miles per hour, and for the whole run 36·3, speeds which illustrate the excellence of the Grand Trunk Road. After lunch the way was resumed to the hills, but the car did not behave itself so well, for a breakdown occurred half way up, just as a heavy thunderstorm decided to deluge the road. A new driver had been recently taken on, an expert in many arts, from cooking a dinner to gingering-up a reluctant car, and in a few minutes he did something mysterious to the inner workings, and the journey was resumed.

The last tour in India was to Kashmir, and a short leave was passed very pleasantly exploring a considerable part of this beautiful country. There is no railway to Kashmir, and there are only two main approaches by road, one via Rawalpindi and Murree and the other via Sialkot, Jammu and the Banihal Pass. The former is an excellent road but subject to the vicissitudes of the weather. Landslides are of frequent occurrence and the road may thus be blocked for days at a time. In the month of May, when the present visit was contemplated, the road had gone at one place, and to effect repairs it was closed on alternate days.

The road from Murree drops by easy stages for 5,000 feet to Kohala, and coming down this way one sees, far below, the tumbled waters of the Jhelum River surging their way forward through a narrow and precipitous valley, and, with lower and nearer view, they can be seen to be carrying onwards in their mighty rush great quantities of giant logs on their way to the saw mills at Jhelum.

(*To be continued.*)

Current Literature.

GRANT, LACHLAN. **Puerperal Temperatures and their Prevention.** *Trans. Edin. Obstet. Soc.*, Session xci, 1931-32, 17, with *Edin. Med. Journal*, February, 1932.

This article is a thoughtful exposition of the causes and prevention of puerperal infections. The writer treats his subject from three standpoints :—

(*a*) The building up of the expectant mother's resistance to infection by means of hygienic pre-natal surroundings and a diet rich in vitamin content and largely of a vegetarian and fruitarian nature.

(*b*) The necessity for careful pre-natal examination and treatment, as required.

(*c*) The methods adopted to minimize the risk of introduction of infection during the conduct of labour.

He takes the view that gauze masks worn by the accoucheur constitute a risk rather than a safeguard. This is debatable ground.

The author strongly advocates the need for spray lavage of the accoucheur's hands and describes in detail apparatus of his own device in the form of portable sprays and adapters to water-taps to secure spray washing under all manner of adverse conditions.

The points he stresses are of clear importance and his article is of value to the practical obstetrician and especially to those who conduct their cases in private houses rather than under hospital conditions.

P. C. FIELD.

LIVINGSTON, S. K. **Maggots in the Treatment of Chronic Osteomyelitis, Infected Wounds, and Compound Fractures.** *Surgery, Gynecology and Obstetrics* (Official Journal of the American College of Surgeons), 1932, liv, 702.

The maggot used was that of the green bottle-fly (*Calliphora erythrocephala*). In order to ensure breeding during the winter, as well as during the warmer seasons, an incubator had to be arranged so that flies could be kept at a temperature of 72° F., and a pan of water was placed in the incubator to keep the humidity at about forty per cent saturation. The air had to be kept moving gently. The flies were fed on a syrup of honey and water with a little yeast. Also a piece of raw meat was placed in the fly cages, and on it the females deposited eggs. The eggs were removed daily and were washed for one hour in 1 in 1,000 perchloride of mercury containing twenty-five per cent of ninety-five per cent alcohol. They were then placed on "agar and beef slants" in test-tubes. Maggots hatched out in about

twenty-four hours. To control sterility of the eggs a few from each batch were placed in glucose broth, covered with a layer of mineral oil and incubated at 37° C. If growth occurred the maggots of that batch of eggs were rejected. Before being used the maggots were soaked in the mercury perchloride alcohol solution for one hour and were then well washed in sterile normal saline solution.

In the series of 100 cases treated by the writer there were five cases of infected compound fractures, comprising fractures of the lower third of both bones of the forearm, of the lower third of both bones of the leg, and crushed wounds about the ankle; there were four cases of tuberculous osteomyelitis involving bones about the elbow-joint; ninety cases of chronic pyogenic osteomyelitis, of which seventy-five per cent were of the femur; also one case of an infected stump.

Ninety-five of these cases healed, 1 died, 2 did not improve, and in 2 there were recurrences.

In cases of compound comminuted fracture, radical *débridement* was performed and, if possible, reduction was obtained before applying the maggots. In the tuberculous and in the pyogenic cases, sequestrectomy was first performed.

After operation the wounds were packed with gauze for forty-eight hours to control hæmorrhage, the gauze was then removed and thorough irrigation with normal saline solution was carried out. Maggots, forty-eight hours old, were then placed in the wound. The writer does not give the number he employed, but he states that it varied with the size of the wound. The wounds were irrigated with normal saline solution every three to five days and fresh maggots were introduced after each irrigation. This procedure was carried on until the wounds had filled with granulation tissue.

At the preliminary operation on a wound the skin was cleansed with green soap and sterile water. No antiseptics were used then nor during the later dressings.

When the maggots had been placed in a wound a dressing was applied, consisting of four layers of non-sterile crinoline (fine mesh), alternated with four layers of finely woven gauze, cut to the size of the wound and held down at the margins by strips of adhesive plaster. In order to cause the maggots to bury themselves the dressed wounds were exposed to daylight or artificial light for two or three hours.

About twenty-four hours after each dressing a large amount of brownish, offensive foam exuded through the dressing material. This foam was found to consist of serum, bacteria, pus and a healing active principle. For the first three or four dressings the maggots remained alive, from three to five days, but after the later dressings they lived only for from three to five hours.

The author considers that three methods of action are concerned, namely, scavenger action of the maggots, serum production in the wound possibly

due to irritation caused by the movements of the maggots and by their attacking necrotic tissue, and so opening up channels for the flow of tissue fluids, and thirdly that some active principle is produced in the wound which has an influence in overcoming infection.

From experiments being carried out in the Edward Hines Hospital, Illinois, where the writer made his observations, it is considered that the active principle is a bacteriophage.

The results of these experiments will be published later.

Reviews.

Rheumatoid Arthritis and its Treatment. Studies from the Royal Mineral Water Hospital, Bath. By Vincent Coates, M.A., M.D., M.R.C.P., and Leo Delicati. London: H. K. Lewis and Co., Ltd. 1931. Cr. 8vo. Pp. xiv + 114. 12 illustrations. Price 6s. net.

Few can be so qualified to discuss the subject of rheumatoid arthritis as are the physicians working in the Royal Mineral Water Hospital, Bath. Since its foundation in 1738, this institution has been filled with patients suffering from this complaint, and it is equipped for the most modern methods of investigation and treatment, so that there is an abundance of data for the teacher.

The authors have produced a very practical and readable little volume, describing the principles and methods they have found of most use in the treatment of the disease, a volume that will be found of value to both medical practitioners and students.

The book, in its six chapters, gives a classification of joint diseases, followed by a description of the clinical and biochemical features of rheumatoid arthritis and directions for its treatment. The chapter devoted to the orthopædic treatment of the joints is particularly useful; a timely exercise of the methods advised should go far to prevent the crippling effects of the disease. We are glad to note that the authors consider that the focal theory of the origin of the complaint has been overdone.

The reader will find much sound advice in the book.

A Guide to Human Parasitology for Medical Practitioners. By D. B. Blacklock, M.D.Edin., D.P.H.Lond., D.T.M.Liver., and T. Southwell, D.Sc., Ph.D., A.R.C.Sc., F.Z.S., F.R.S.Edin. London: H. K. Lewis and Co., Ltd. Pp. viii + 272, with 2 Coloured Plates and 122 Illustrations in the text. Price 15s.

The authors' object is to provide practitioners and students with a simple guide to the more important protozoa and helminths infecting man. Their long teaching experience has convinced them that in courses of

parasitology which are necessarily of brief duration, those undergoing instruction tend to be overwhelmed with masses of information new to them, and so fail to sift out and grasp the points of real importance. And with this, most teachers and examiners will agree. In examinations in tropical medicine it is not uncommon to find candidates who can give a creditable account of, say, *Enteromonas*, and yet who can be badly shaken in their identification of malaria parasites, or come to grief over an *E. histolytica* cyst. Whereas if beginners are kept to the common and important parasites, and thoroughly grounded in their essential characters until they can be recognized with accuracy and confidence, it is easy later on to build further on this good foundation as the necessity or opportunity arises.

The authors have carried out their project in an admirable manner. Their descriptions of parasites are clear and to the point, and they give much valuable and practical advice regarding the preparation of material for examination, and point out likely errors in the identification of the parasites described. The book is profusely illustrated by excellent figures, mostly original, amongst which the graphic diagrams of the life-history of twenty-three species of helminths call for special mention. The unco guid may cast up their eyes at part of the zoological classification—*Spirochæta* being given a standing almost Linnaen in its catholicity—but the authors defend their opinions stoutly, and at any rate their grouping has the saving grace of simplicity.

Even the most casual glance over the book shows that it is written by skilled teachers who appreciate the difficulties of the beginner, and who have made an effective study of how these may best be overcome.

A first-class manual.

DISEASES AND DISORDERS OF THE DIGESTIVE ORGANS. By Adolphe Abrahams, O.B.E., M.D.Camb., F.R.C.P.Lond. (Pocket-Monographs on Practical Medicine.) London: John Bale, Sons and Danielsson, Ltd. 1932. Pp. vi + 110. Price 2s. 6d. net.

This is the first volume of the new series of Pocket-Monographs on Practical Medicine, published by John Bale, Sons and Danielsson, Ltd., and very suitably deals with a class of disorder which is frequently met with by the practitioner.

The first chapter deals, in a general way, with the nature and causes of dyspepsia. The next four chapters describe in detail the proper method of investigating a case, how to give test meals and how to test the stools for occult blood. Then come chapters on all the different types of digestive disorders.

Dr. Abrahams has made the subject of "indigestion" particularly his own, and is to be congratulated on the very excellent handbook he has now written.

Radium and Cancer. By H. S. Souttar, C.B.E., M.D., M.Ch.Oxon., F.R.C.S.Eng. (Pocket-Monographs on Practical Medicine.) London: John Bale, Sons and Danielsson, Ltd. 1932. Pp. viii + 64. Price 2s. 6d. net.

In this volume Mr. Souttar gives a very clear summary of radium and its use in surgery.

In the first chapter there is a short account of the physics of radium, which helps one to understand its mode of action; then follows a description of the apparatus and of the methods used in the application of radium. The next chapter deals with the reaction of the various tissues to radium and its emanations. In Chapters IV to X the methods of application and results of the action of radium on cancers of various organs are described.

In a small book such as this extensive and multifarious descriptions cannot be given, so the writer of this volume has stated shortly and clearly the methods he employs and the results obtained, and in addition gives the methods adopted by other workers if they differ in principle from his.

In the final chapter, headed "Accidents following the Use of Radium," the results of overaction of radium are described, as are the risks run by those employing the treatment.

This is an instructive volume, containing a large amount of information of practical value.

Naturally a practitioner will not consider himself competent to apply radium after a perusal of the book, but he will have a sound knowledge of its mode of action, the conditions in which it is likely to give good results and of the prognosis which may be expected.

The Acute Abdomen. By C. H. Fagge, M.S.Lond., F.R.C.S.Eng. (Pocket-Monographs on Practical Medicine.) London: John Bale, Sons and Danielsson, Ltd. 1932. Pp. viii + 92. Price 2s. 6d. net.

There is no subject of greater importance to medical men than "the acute abdomen." Operating surgeons, when faced with the problem, so often operate first and diagnose the case afterwards. It is not given to many of them to be great diagnosticians and teachers, as well as technica experts.

The author of this Pocket-Monograph clearly shows that he is a teacher of the first rank—the clear and lucid way in which the subject is dealt with shows the master hand. The book will be of the greatest help to the practitioner.

We hope that the other volumes of this series will be able to keep up this high standard.

Notice.

CONGRESS OF THE ROYAL SANITARY INSTITUTE.

At the invitation of the Corporation, the next Congress of the Royal Sanitary Institute, of which Lord Balfour of Burleigh is the President will be held at Brighton from July 9 to 16, 1932.

Lord Leconfield, Lord Lieutenant of Sussex and Chairman of the West Sussex County Council, will preside at the Congress.

The wide field covered is shown by the following list of subjects which will be discussed:—

The work of local authorities relative to cancer. Prevention of measles mortality. Vaccination. Birth control. Infant welfare work in urban and rural districts. The educational side of a school nurse's work. Food and nutrition. Illumination in industry. Visual fatigue in industry. The law relating to meat inspection. The duties of a whole-time county veterinary inspector. National Health Insurance: some administrative problems. Medical treatment of the sick poor. The advantages of all-electric houses. The advantages of houses with electric lighting, and gas for heating and cooking purposes. Disposal of house refuse. Mental hygiene. Health conditions in underground offices. Building densities. Town and Country Planning Bill. Aerobic and anaerobic organisms in sewage treatment. Sea outfalls for sewage. Municipal activities in Brighton. Housing Act, 1925: slum-ending *versus* slum mending. Public services in urban and rural districts. Anomalies of the Shops Acts. The manufacture and sale of ice-cream in relation to public health. Teaching of hygiene and mothercraft in schools. Clerical duties of a health visitor. Nursing training: with special reference to the public health services.

Professor C. E. A. Winslow, Professor of Public Health at Yale University, will deliver the Lecture to the Congress, and he will take as his subject "Current Tendencies in American Public Health."

This Congress is regarded as the most important public health gathering of the year, and a large attendance is already assured.

A large Health Exhibition has been arranged in connection with the Congress in the Dome and Corn Exchange. The exhibits will include infant and invalid foods, household and kitchen appliances, hospital appliances, sewage disposal apparatus, refrigerators, gas stoves and fittings, disinfectants and disinfecting apparatus, soap, and sanitary and drainage appliances.

The Mayor of Brighton is the Chairman of the Local General Committee; the Town Clerk and the Medical Officer of Health are acting as the Honorary Local Secretaries.

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